ELECTRICAL REVIEW

9th MAY, 1952

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Clearing the Air

BY centralizing the combustion of bituminous coals in power stations under skilled control the electricity supply industry makes a major and increasing contribution towards improvement in atmospheric conditions. In contrast, a large proportion of road and rail transport still relies on localized production of energy, thus lagging behind the general trend. In doing so it adds to the pollution of the air we breathe; an example, instanced in *Smokeless Air* (the journal of the National Smoke Abatement Society), is that motor-buses in London alone are responsible for 31,000 tons of soot each year. Another form of local combustion, the domestic open fire, is, however, the chief source of contamination. The possibility of developing closed stoves that would burn fuel smokelessly and more efficiently has naturally appeared attractive to many people, who have too readily assumed that what may seem to them desirable is capable of fulfilment now.

A more realistic appraisement of the position is made in the same issue of the journal mentioned. Dr. G. E. Foxwell (president of the Institute of Fuel), like Mr. D. H. Parry in his recent I.E.E. paper, attaches most importance to adequate heat insulation of houses, the extra capital cost of which, he urges, would be well worth while. Regarding smokeless solid fuel appliances, his experience is that the problem of obtaining satisfactory performance at the low prices necessary to meet a general demand is far from solution; for example, at low combustion rates the ingress of unwanted air, particularly below the grates, often prevents any control whatever.

An even greater problem is that of the provision of suitable fuel, which at present is virtually non-existent in relation to requirements. Such fuel is mainly a manufactured or processed product, as distinct from the comparatively plentiful raw bituminous coal, which owners of solid fuel fires would be driven to use, though neither smokelessly nor efficiently, for at least twenty years. The

only practicable policy is therefore one that can gradually be evolved on sound lines. Dr. Foxwell agrees with those who hold that consumers must be provided with a fuel and a service that will persuade them of their own volition to adopt smokeless fuels and modern methods of heating. Giving "fuels" its broadest meaning and having faith in the fruits of research, we believe that the greater use of low-grade bituminous coal in generating electricity can remove any need for anxiety on account of a lack of smokeless fuels.

SUCCESS IN AMERICA

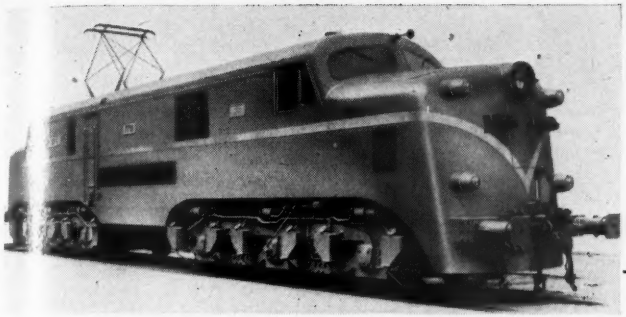
Great Britain's endeavours to earn dollars have again been rewarded, this time by the awarding of a contract for an 80,000 kVA transformer to the English Electric Co., Ltd. An American Embassy note informs us that this company was the only tenderer able to promise delivery within the stipulated 730 days. The shortest period quoted by an American concern was 917 days and its price was substantially higher. The transformer is for a Government-sponsored power project. As we said in our leading article of 28th March, the official view of British efforts in the American market is more tolerant than that of some home manufacturers. In the present case the U.S. Department of Commerce has said that "English Electric's progress on its new contract work no doubt will be closely watched by many in the United States."

STANDARD SPECIFICATIONS

By a coincidence the British Standards Institution has published a Colour Code for fixed resistors for telecommunication purposes while, as mentioned in this issue, an identical Colour Code has also just been issued in Geneva by the International Electrotechnical Commission. At first sight it may appear that to have a British Standard and an International Standard in identical terms is a duplication of effort, but it should be remembered that the specifications published by the I.E.C. are in the nature of model specifications which are available to the National Committees to adopt as their National Standards if they so wish. The British National Committee has always followed the I.E.C. recommendations as far as possible and there are already several British Standards which are based on, or even identical with, the corresponding I.E.C. specifications. The issue of the B.S. 1852 Colour Code emphasizes this point and shows that the United Kingdom is abreast, or even just in front of, the I.E.C. The latter has also just published a specification for lamp caps and holders, together with gauges for ensuring interchangeability. In this case, again, the British Standards are in line with the international recommendations. The I.E.C. documents can be purchased from the B.S.I. in London.

TELEVISION PIONEERS

Credit was given to British television pioneers by Mr. Lynn Poole, of the Johns Hopkins Science Review, in a television item presented by the B.B.C. last week. This was the first of a series "An American Looks at Science in Britain" which is being "telecast" in the United States. The principal feature was a demonstration at the Institution of Electrical Engineers of J. L. Baird's original 30-line apparatus by Mr. T. H. Bridgewater, superintendent engineer, television outside broadcasts, B.B.C. Viewers also saw Dr. James McGee with an example of the television cathode-ray tube which he produced in 1932, a year after the one developed in America by Vladimir Zworykin. Mr. Poole mentioned the pre-vision of A. A. Campbell Swinton in a letter to *Nature* in 1908 when he suggested that the cathode-ray tube with electro-magnetically deflected beam would form the basis of future distant vision.



A view of one of the twenty 3,600 h.p., 3,000 V d.c. electric locomotives for the Spanish railways

Locomotives for Spain

Most Powerful Units Ever Built in this Country

ON 30th March, 1950, a contract was signed in Madrid between the Red Nacional de los Ferrocarriles Españoles and the English Electric Export and Trading Co., Ltd., for the supply of twenty complete 3,600 h.p., 3,000 V d.c. electric locomotives for 5ft 6in gauge working and a number of partial equipments. In November, 1951, this contract was increased to make a total of sixty complete locomotives, eliminating the partial equipments. Altogether this contract is worth about £4 million. The first of the locomotives has now been completed and last week it was inspected by officials of the Spanish Embassy and Railways.

The locomotives are the most powerful of their type so far manufactured in this country. The mechanical parts of twenty of them are being built at the Preston works of the English Electric Co., Ltd., and forty at the Vulcan Foundry, Newton-le-Willows, where the official inspection took place. They have a " Co-Co " wheel arrangement (two three-axled bogies) and incorporate regenerative braking. Each weighs about 120 tons in working order and is 67ft 9in long over the buffers. The maximum starting tractive effort at 25 per cent adhesion is 67,000 lb, while the one-hour tractive effort is 39,000 lb at 34 m.p.h. and the continuous tractive effort 30,500 lb at 36 m.p.h.; the maximum service speed is 71 m.p.h.

The railways in Spain have been operating for more than a century. The first section opened to public traffic was the Barcelona–Matara line inaugurated on 28th October, 1848, followed by the Madrid–Aranjuez line on 9th February, 1851. The configuration of the land in Spain is mountainous in many parts so progress in railway construction has been slow, but now there is a comprehensive series of lines covering most of the country's principal areas.

Originally the railways were private concerns but in May, 1939, the Spanish Government took over control of the three principal companies operating 86 per cent of the broad gauge mileage. This was followed by a Law of 24th January, 1941, by which the State took over all the broad gauge railways as from the first of the following month. This system is known as the Red Nacional de los Ferrocarriles Españoles (National System of Spanish Railways).

The total route length of the broad gauge (5ft 6in) lines in Spain is now 8,037 miles. In addition there are 3,230 miles of narrow gauge (mostly one metre) which are not part of the national system. The principal electrified zones are at present between Ujo-Busdongo and Torre-Brañuelas on the Leon, Ponferrada, Oviedo sections in the north of Spain, the

Madrid section in the centre and the Barcelona section in the east.

It is intended to extend the main line electrification on the basis of 3,000 V d.c. instead of 1,500 V d.c. in view of the long distances involved in new projects and the heavy traffic to be handled. The sixty main line locomotives being supplied by the English Electric Co., Ltd., will operate on the northern section of the railway which was originally the Norte Railway. At present the Torre-Brañuelas section adjacent to Ponferrada is operating at 1,500 V d.c., but it is intended to change this to 3,000 V d.c. and to extend the electrification from this section. It is planned to have the first of the new 3,000 V locomotives running this year.

Spain is now embarking on a comprehensive programme of rehabilitation and extensive use is being made of the hydro-electric resources to provide power not only for the electrification of railways but for industrial development.

In October, 1951, the first post-war hydro-electric station equipped by the English Electric Co. at Cofrentes was opened and this is producing power for the Province of Madrid. Other new hydro-electric stations will be in operation in the fairly near future.

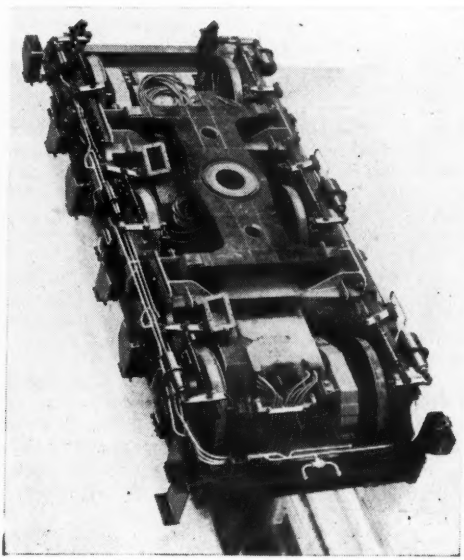
The superstructure of the new locomotives is streamlined with a cab at each end mounted at the rear of each nose-end compartment. Between the cabs the equipment is symmetrically mounted, with a 20 kW motor-generator-blower and two cubicles containing the main control equipment at each end and, in the centre of the locomotive, four frameworks containing the main starting resistances.

The h.v. equipment is in separate compartments with interlocked doors opened by the removable reverser key of the master controller. Before any door can be opened a fouling bar must be moved and this opens an air valve lowering the pantograph. The driving cabs have two wide front windows with one fixed and one drop window at each side. The driving position is on the right-hand side of the cab there being a master controller, air and vacuum brake valves, instrument panel and auxiliary equipment board. An upholstered seat capable of vertical and horizontal adjustment is provided.

The body underframe consists of four rolled steel channels of deep section well braced with cross members and the superstructure comprises channel members welded together, the whole forming a body frame of girder construction. The bogies are of the six wheel bar frame type braced by welded cross stretchers. The weight of the locomotive superstructure is transferred to each bogie through a fabricated bolster which carries the bogie centre and rests on four nests of laminated springs arranged transversely to the centre line of the locomotive. These springs are supported on spring planks slung from the bogie frame by means of links. The bogie frame is carried on four pairs of coil springs on the equalizer beams and is so arranged that the static loads on the axles are equalized. The spring of the bolster is limited by stops. This provides robustness with good riding qualities to enable the locomotives to operate over the severely curved tracks over which they are to run.

Westinghouse vacuum controlled

Each bogie incorporates three 600 h.p. force-ventilated axle-hung nose-suspended motors



air brake equipment is fitted on the locomotive which is equipped for hauling vacuum-braked trains. Control of the service braking is from the driver's vacuum-brake valve which operates the train brakes and, through a proportional valve, the air brakes on the locomotive, which can also be controlled separately by means of a self-lapping driver's brake valve.

In each driving cab there is a cam-operated master controller incorporating drums for power notching, motor field weakening and regenerative braking. Each drum is operated by a separate handle and there is a handle for operating the motor grouping switch when using the regenerative brake. Mechanical interlocking is provided to prevent incorrect operation of the handle.

The contactors, group switches and reversers are mounted in steel cubicles. The power contactors, reversers and group switches are operated electro-pneumatically and the auxiliary circuit contactors electro-magnetically.

The starting resistances are of the edge-wise-wound type mounted on heat-resisting ceramic insulators. The units are supported on steel rods and these assemblies are housed in steel supporting frames.

The six traction motors are of the force-ventilated axle-hung nose-suspended type coupled to the axle through single reduction flexible spur gears. The one-hour rating of each motor is 600 h.p. and the continuous rating 500 h.p. with a line voltage of 3,000 V, these ratings being in accordance with B.S.S. 173 for Class B insulation. Each motor is fitted with grease-lubricated roller armature bearings and sleeve suspension bearings oil and cotton waste lubricated. Former-wound bakelized armature coils are used. The field coils are machine-wound, the complete coils being vacuum impregnated in synthetic high temperature varnish and baked. A wedge-bound commutator is used.

The gearing is enclosed in a welded sheet-steel split gearcase which is supported from the motor frame. The pinion is shrunk and keyed on to the motor shaft, and the gear wheel pressed on to the axle. A special feature of the design of the gear wheel is that it allows a certain amount of torsional flexibility between the motor armature and the axle. Current is collected by two double-pan pantographs which are air-operated and spring controlled. There

In each driving cab there is a cam-operated master controller incorporating drums for power notching, motor field weakening and regenerative braking

are two 20 kW motor-generator-blower sets each consisting of a 3,000 V motor driving a generator and a rotary fan. The generators provide power at 110 V for the auxiliary circuits, regenerative braking and battery charging. The fans each supply cooling air to three traction motors.

For supplying compressed air for the control apparatus and operating the locomotive brakes, there are two motor-driven air compressors supplied from the low-voltage supply. Two motor-driven exhausters of large capacity supplied from the l.v. supply are used for the operation of the train brakes. A lead-acid battery provides power for operation of the l.v. apparatus in the event of emergency.

New E.A.W. Branch

THE inaugural meeting of the Falmouth E.A.W. Branch was held on 25th April, the speakers including Dame Caroline Haslett, Director; Councillor Surgeon-Commander J. L. Lean, J.P., the Deputy Mayor; and Mr. C. J. Hocking, Sub-Area manager, South Western Electricity Board. The chairman of the Branch is Mrs. C. J. Hocking, the hon. secretary, Miss Firth McDonald, and the hon. treasurer, Mrs. E. Hawkin.

VIEWS on the NEWS

By REFLECTOR

IS there not some confusion of thought in the National Coal Board's views of the future? It has been suggested by more than one of its officials that if the British Electricity Authority is allowed to proceed with its generating plant programme it will absorb most or all of the increase in coal output which the N.C.B. contemplates in the next decade or so. It appears to be assumed that the consumption of raw coal and electricity will continue at present-day rates. Actually electricity will continue to take the place of raw coal in industry and the home (and maybe the railways) and so the B.E.A.'s increased consumption of a coal which nobody else wants will not be purely additive.

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Restrictions upon imports imposed by some of their overseas customers have left a prominent firm of clock makers with insufficient work for their employees. It therefore proposed to dispense with 200 men who had become redundant. This led last week to an "unofficial" strike of 1,200 at their Cricklewood works in support of a series of claims the principal of which was that employees considered by the company to be redundant should be retained until suitable alternative employment was found for them. The men's union, the Amalgamated Engineering Union, did not "recognize" the strike, which is as well I think for this is a strange way of ensuring "full employment."

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There is now a definite disposition on the part of electrical people to respond whenever they read disparaging remarks about electricity. For too long they have lain low, fearing to question any suggestion ostensibly aimed at easing the power shortage but accompanied by axe-grinding noises. One of the latest rejoinders is that sent to the *Iron and Coal Trades Review* by Mr. R. E. Gamlen. He queries that journal's ideas on the subject of fuel efficiency and again insists that the coal used in power stations is unsuitable for use elsewhere. To turn it into electricity means a saving of good coal which could be exported—a form of export most acceptable in world markets.

* * *

Mr. Gamlen has also tackled Mr. E. Bellingham, director-general of the Coal Utilization Council. In a letter to the *Financial Times* he reiterates that electricity is generated largely from unmarketable slack and goes on to say:—

> "I have sent Mr. Bellingham an average sample of the slack used at a large power station and I ask him what his other customers, the housewives, would say if they had to store and handle and stoke the stuff on to these modern grates."

He concludes by pointing out the gross waste of manpower involved in the use of raw coal in the home.

* * *

Weymouth ratepayers are fortunate. The Town Council is among the few able to reduce their rate demands, and one of the reasons is a proposed change from gas to electric street lighting. According to a report submitted to the Council I see that it costs £15 a year to keep a gas lamp alight but only £5 5s for an electric one. Even allowing for loan charges of £260 which have to be paid for ten years, the conversion of 70 gas lamps will produce an annual saving of £427—without wielding the "economy axe."

* * *

I have referred before to the niceties of grading in the B.E.A. and Electricity Board services. Now in the staff magazine of the North Eastern Board and Division I have come across a "labourer/acting ash remover." It is to be hoped that he will still recognize his old friends when he is confirmed in his rank.

British Industries Fair

Electrical Manufacturers' Important Part

IT is a perennial source of gratification to the visitor to the British Industries Fair that so many British manufacturers in all spheres of industrial activity consider it worth while going to so much trouble and expense to arrange such excellent displays. Although the Fair lasts less than a fortnight many exhibitors produce quite elaborate designs for their stands and set up equipment in a permanent-looking manner. And they have in attendance expert members of their staff who are able to discuss their companies' products with potential buyers and no doubt learn a great deal from them to aid in future development.

In no part of the Fair is this truer than the Electrical Section at Castle Bromwich, Birmingham, but it is difficult without doing injustice to many to single out particular stands for mention. We can only recommend that everybody in the industry who can manage it should spend a day at the Fair. They will find it instructive and profitable although somewhat exhausting if the whole of the exhibition is to be inspected.

We repeat our last week's invitation to visitors to the Birmingham Section to call at the *Electrical Review* stand (No. C616) where our representatives will be glad to give information and all possible assistance.

In conjunction with the Midlands Electricity Board, the British Electrical Development Association has this year concentrated attention upon a single aspect of industrial electrification—pottery production. It is pointed out that with the old type of intermittent bottle kiln about eight tons of good quality coal was consumed per ton of ware produced; with the latest electric multi-passage kiln the equivalent of only half a ton of low-grade coal is consumed.

Among the processes depicted in the display are clay conditioning in a motor-driven pug mill; clay throwing with a motorized potters' wheel; firing in an electrically-heated batch oven; brushing bisque ware with a motor-driven brush and dust extractor; glazing in an electric glost oven; decorating and gilding china ware at a well-lighted bench; and the high-voltage testing of insulator ceramics.

It is indicative of the scale of the electrical

Electricity in pottery production is the theme of the joint stand of the British Electrical Development Association and the Midlands Electricity Board

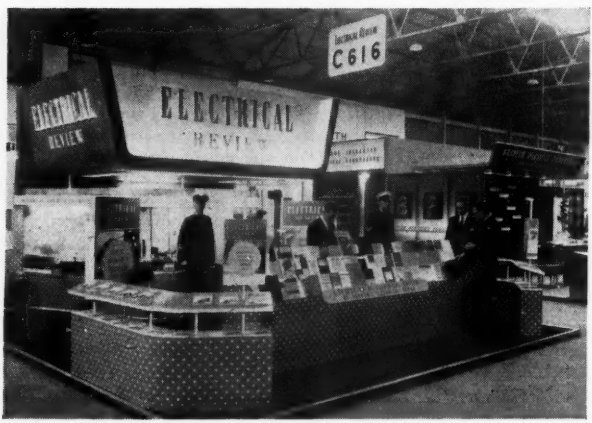
industry and its many ramifications throughout the country's economy that about a third of the 1,250 stands at Castle Bromwich are either purely electrical or have a substantial affinity to the electrical industry. The domestic appliance manufacturers are still represented although there seems to have been some tendency for them to move to the London Sections at Olympia and Earls Court; some have displays both at Birmingham and in London.

Special mention should be made of the greatly-improved main front of the Castle Bromwich buildings. This is of a clean modern design and a great improvement on the camouflage-netting decorated front which has greeted the visitor in recent years.

Speaking to Press representatives at Castle Bromwich last Friday, Mr. S. F. Burman, chairman of the Fair Management Committee, said that the number of exhibitors was slightly higher than last year. He emphasized the fact that the Fair was designed primarily to show foreign buyers what Great Britain was able to supply although its industry was much engaged in defence production. Buyers from well over a hundred territories were expected to come to the Fair.

At the opening of the Fair on Monday, performed by the Lord Mayor of Birmingham (Alderman R. C. Yates), Mr. Burman said that exporting was a risky business under existing circumstances. He thought that the Government should give greater incentives to manufacturers to export, remarking that he had in mind a taxation rebate on export business and increased allowances of foreign currency for firms developing business abroad. In that way, coupled with the patriotic drive now being undertaken by manufacturers, the balance of payments problem could be settled within the next twelve months.

An appeal to all in the engineering industry to do their best to raise their output to meet overseas demands and to enable the flow of capital goods to the home market to be increased was made by the Chancellor of the Exchequer (Mr. R. A. Butler) at the B.I.F. dinner held at the Mansion House, London, on Monday.



The *Electrical Review* stand (C.616; telephone "Fair 533") where members of the staff are ready with information on the Fair and the electrical industry

Industrial Exhibits

Speeding Up Production

ONCE again we use the theme "increasing production" for our review of the industrial electrical exhibits at the Birmingham section of the British Industries Fair. In view of what is actually on show, against the background of rearmament getting into stride in parallel with the intense export drive, it would be unrealistic to do otherwise. But from this general production viewpoint *only* there is more of electrical interest outside the electrical section than in it, simply because the electrical applications to production are inevitably depicted and indeed emphasized in the general engineering section, which might be called nowadays the "production section."

In order of importance to industrial production, the electrical drive comes first. But to fit this brief survey to to-day's special conditions, we have placed a few broad electrical aspects in what we believe to be their correct order in terms of their influence on speeding up general production, viz.: materials handling, electrical equipment adaptability, power transmission, electrical controls, production efficiency and economy, and electricity supply and distribution equipment. Considerable overlapping of the subjects is unavoidable, and we could make out a good case for putting the last-mentioned subject first.

The working model of the comprehensive conveying and elevating system displayed by the Ewart Chainbelt Co., Ltd., makes a good opening for the materials handling section. It incorporates such components as a slat conveyor, a swing tray elevator and an automatic spacer, any one of which may constitute a separate handling equipment under suitable production conditions. The hamping, elevating and descending slat conveyor on show by J. Collis & Sons, Ltd., strikes a very modern note. It is designed to bridge in particular production flow line equipment, which might otherwise be an obstacle, and thus to prevent production hold-ups on the flow line.

Transmission on the actual exhibit is from the slat conveyor to a gravity roller which is fitted with tapered rollers to form a right-angle bend, and then to a "Motaveyor" which feeds a power "Rolaveyor." The height to under the bridge is 7ft 6in and the actual total length measurement of the slat conveyor proper is 25ft, but usually such equipments are made individually to specification. The belt material of the "Motaveyor" can be of any suitable type to suit the product, for instance, plastic in the case of sticky products. The driving unit for the slat conveyor is a 1 h.p. geared motor with a transmission of suitable ratio to afford a conveyor speed of about 25ft/min, but here again the speeds are designed to specification according to production programme.

The zinc plating plant by the Electro Chemical Engineering Co., Ltd., on the stand of the Electric Furnace Co., Ltd., is a very good example of combined materials handling and processing plant. This "Efco-Udylite Junior" plant is fitted with an automatic loader and off loader. The movements are hydraulically operated under the control of electrical devices. About 10ft high to the superstructure carrying the lifter frame and about 30ft long, the plant is suitable for installation in normal small plating shops. It will deliver 75/120 racks per hour, according to the treatment required, and while it can be adapted for nickel, copper, cadmium and other types of plating, the emphasis to-day is on the protection of many products by bright zinc plating. The timing is adjusted to suit any production programme. The vats are electrically heated by thermostatically controlled immersion heaters.

How often have we seen the mono pump at work in all sorts of factories, but how seldom have we heard it referred to as essentially a motor driven materials handling equipment. A model partly cut away to show the rotor, on the stand of Mono Pumps, Ltd., brings out this feature forcibly, because the rotor is not a pump unit in the liquid pumping sense and it is certainly not a worm screw or feeder. We have

seen it handling slurry in a magnesium factory and other applications are to slip (clay) in the potteries, food products such as peas, sausage meat and fondant creams, coal dust laden water and slurries in the colliery, pulp in the paper mill and yeast in the brewery.

Similar comments can be made about the fan, air being an ideal medium for conveying certain materials. In a modern and large textile works we have seen the cotton transferred from process to process entirely pneumatically. An exhibit by Keith Blackman, Ltd., supports the point we are trying to make. It is a two-stage high efficiency blower which is particularly suitable for conveying materials on the injection principle—wool, wheat, cotton, etc. The fan is directly driven and the motor is mounted centrally on to the blower casing. Air is also the materials handling medium in a fine grinding plant displayed by Bramigk & Co., Ltd.

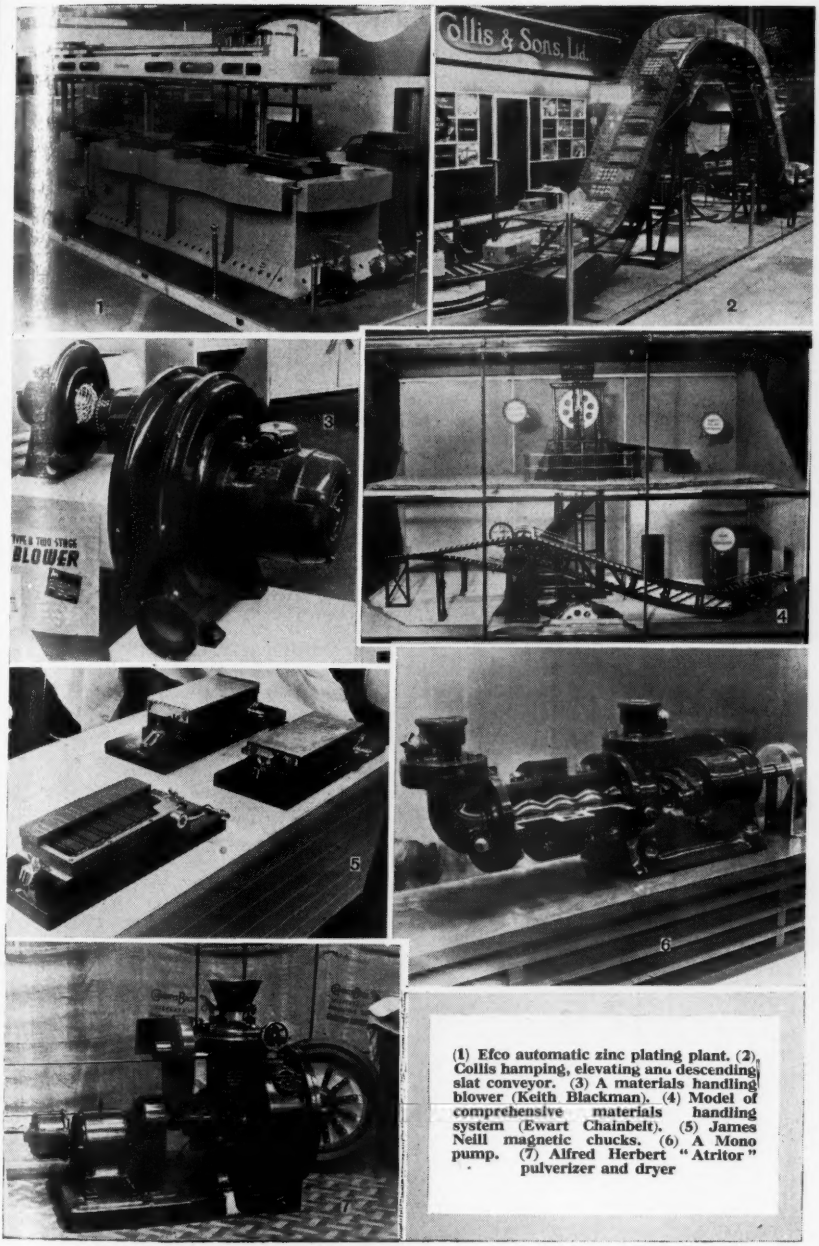
An old friend in the power station world is the " Atritor " coal pulverizer. In a modified form on the stand of Alfred Herbert, Ltd., it is a dual process equipment—grinding and drying—and with the air stream to carry the ground material away it becomes materials handling equipment. Made in six sizes with capacities of from 900 to 13,000 lb/hr, its suitability for firing boilers, cement kilns and metallurgical furnaces is proven. It will also grind and dry in one operation coal, limestone, chalk, sewage-sludge, ball clay, china clay, etc.

The magnetic chuck has long since been an essential work handling (holding) accessory of certain machine tools, but there is not often the opportunity to see the construction of these valuable units such as is now afforded by the " cut away " models on the stand of James Neill & Co. (Sheffield), Ltd. A development of the principle of the chuck is the permanent-magnet holder on the same stand. By means of its various magnetic faces and face formations it will hold bars, tubes and plates in all manner of assemblies for many welding and machinery operations. Up to now the use of magnetic floaters, shown by the same company, has been confined to ferrous sheets of up to about 10in wide. But now, by the use of a vertical arrangement of a number of magnets, very much larger sheets can be handled—up to 3ft wide and 6ft long and weighing 94 lb—at the present stage of development.

Like " automatic electric control " there is a special significance in the term " electrical equipment adaptability." This inherent electrical property, meaning flexibility in the broadest possible sense, cannot be matched in any other field, and it applies to all of a very wide range of electrical production equipment. Two heavy-duty B.I.F. exhibits illustrate this point particularly well in regard to the electric drive. One is a stone breaker, an outside exhibit by William Henry Baxter, Ltd. It is a 36 by 24in napping motion equipment with an output of 60 tons/hr to 6in size. A 50 h.p. 965 r.p.m. Brook motor in the actual exhibit transmits its power, via a multiple V-belt scheme of 3 to 1 reduction ratio, to the machine shaft. The other exhibit, by Thompson Brothers (Bilston), Ltd., is a mixer for plastic powders, in which the method of incorporating the motor emphasizes its adaptability. The motor is overhung from a gear box at the top of the vertical machine shaft.

Again electrical adaptability is strongly expressed in the power press, especially when this is electrically heated, and mention may be made of an outstanding exhibit by Jackson, Heywood & Co., Ltd. This " Twin-O-Matic " 50-ton hydraulically operated plastic press is self-contained with a motor driven Fraser " Mono Radial " pump, and each of its four hot plates is electrically loaded at 1,600 W, each plate element bank being thermostatically controlled by a pre-set Teddington indicator controller. As the pressure is applied operation of an electric contact pressure gauge puts into motion two process timers which, at zero, switch in a red light, indicating the completion of the cure. By means of a lever the pressure is released and the timers automatically revert to the pre-set position.

The modern h.f. inductor heating equipment has a special place in the " adaptability " field because of the ease with which it is fitted into almost any production flow line. The English Electric Co. high frequency heating equipment is capable of putting 25 kW of heat energy continuously into ferrous work. An impedance matching device enables the load to be adjusted so that the



(1) Efco automatic zinc plating plant. (2) Collis hamping, elevating and descending slat conveyor. (3) A materials handling blower (Keith Blackman). (4) Model of comprehensive materials handling system (Ewart Chainbelt). (5) James Neill magnetic chucks. (6) A Mono pump. (7) Alfred Herbert "Atritor" pulverizer and dryer

generator will continuously give its rated output regardless of the change of load which takes place at about 750 deg C in the case of steel. The use of mercury arc rectifiers offers two advantages over filament rectifiers: (*a*) the valve is virtually indestructible, (*b*) there is no warming up period. A British Thomson-Houston electronic h.f. heating equipment operating at 400,000 c/s also puts 25 kW into the work. It can be completely manually controlled, manually controlled for heating only, or completely automatically controlled. For the last-mentioned method a process timer controls the duration of heating, while an automatic regulator maintains the output at a pre-set level. A rectifier uses six grid controlled mercury vapour valves, and a self-excited oscillator includes a tank circuit of large kVA, which enables the equipment to heat conductive materials like brass and copper. Demonstrations are: heating a graphite block to 2,000 deg C and surface hardening a billet of EN12 to 122 tons/sq in.

That welding is no exception to the adaptability rule is shown by the Holden & Hunt spot welder, to which special purpose characteristics are imparted by specially shaped electrodes, and G.E.C. research cold rolling exhibits. The G.E.C. cold pressure welding process enables metals to be homogeneously welded solely by pressure. So far the greatest success has been achieved in cold welding aluminium and copper, but there is considerable promise for the future with other metals and alloys.

Need we comment on the adaptability of the portable electric tool? On the stand of Wolf Electric Tools, Ltd., we chose the ¾in heavy duty drill which is particularly suitable for work on heavy constructional and structural engineering and for heavy maintenance work. Closely associated with the portable tool from the same viewpoint is flexible shaft transmission such as is employed in one of the exhibits of E. C. Hopkins, Ltd. It is a pedestal type machine, the pedestal base being fitted with casters. The overhead factory busbar distribution scheme, such as the English Electric equipment, illustrates how the adaptability of the motor is increased enormously by making so simple the changing of the machine motor position to suit any production programme.

Next power transmission, because the works electrical engineer so readily enhances or mars the efficiency of a driving scheme, and of the production machine too, by selecting the correct or incorrect transmission method. David Brown depict a fine example of gear cutting. We are illustrating the vertical geared motor on display by Follsain-Wycliffe Foundries, Ltd., because so frequently do we see in connection with vertical drives cumbersome arrangements of right-angle transmissions.

In these "material handling" days the variable speed problems are particularly acute in connection with conveyor and similar drives. The Hainsworth variable speed transmission scheme is shown by J. H. Fenner & Co., Ltd., as applied to a simple production belt conveyor. The scheme employs the V belt and cone principle in which cones open and close to form a V-groove pulley of infinitely variable pitch diameter, which enables the belt speed, and hence the conveyor speed, to be increased or reduced at will.

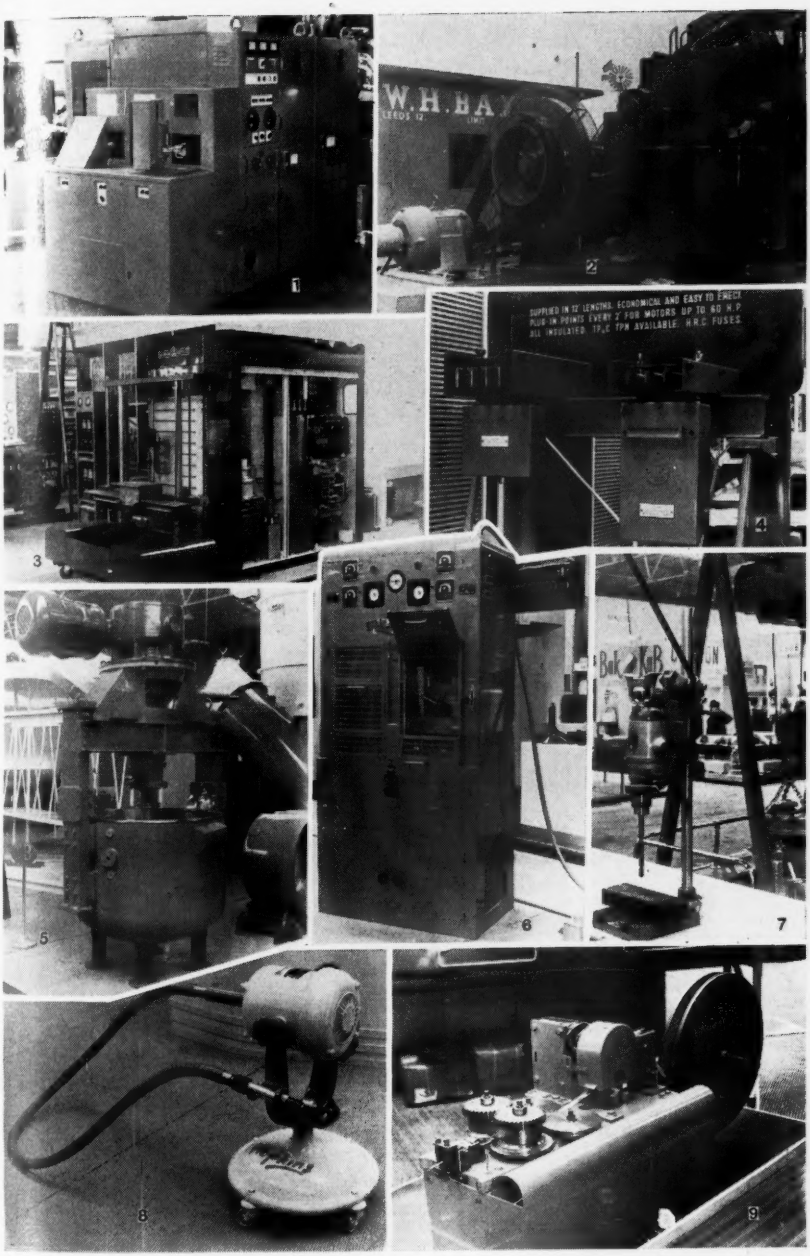
Another particularly interesting variable speed equipment is the Kopp "Variator" on display by Allspeeds, Ltd. Cone pulleys are also used here, but in conjunction with a set of balls in each case.

In emphasizing the foregoing mechanical methods of speed variation we have not the slightest intention of belittling the directly electrical means afforded by the variable speed motors, including the still inimitable d.c. motor in this field, coupled with the excellent electrical control schemes available. The point we strongly stress here, however, is that the works engineer is more often faced with the problem of having to adapt mechanical variable speed schemes to constant speed motors than he has the

EXHIBITS AT CASTLE BROMWICH

(*See Opposite Page*)

(1) B.T.H. h.f. heating "flow line" installation. (2) Baxter stone breaker. (3) English Electric h.f. heating "flow line" installation. (4) English Electric overhead busbar works system. (5) Mixer for plastic powders (Thompson Bros.). (6) "Twin-O-Matic" plastic press (Jackson Heywood). (7) Wolf ¾in portable electric drill. (8) Heavy duty Hopkins flexible shaft machine. (9) G.E.C. cold rolling research equipment


W.H.BA
LEEDS 12
SUPPLIED IN 12' LENGTHS. ECONOMICAL AND EASY TO ERECT
PLUG-IN POINTS EVERY 2' FOR MOTORS UP TO 60 H.P.
ALL INSULATED. TP.E TPN AVAILABLE. H.R.C. FUSES.
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opportunity to install purely electrical schemes which nearly always means purchasing new equipment from the manufacturers, directly or indirectly, which is specially constructed in order to meet his needs.

A purely electrical control scheme being shown by the Metropolitan-Vickers Electrical Co., Ltd., depicts the application of electronic control to the take-up or let-off drive for a reel of continuous material, where the material is fed on or taken off the controlled reel by one normal motor drive—a problem frequently met in the textile industry, paper making and in the continuous rolling of steel strip. The controlled reel in the model is driven by a wide-range variable speed motor which is electronically controlled by thyratrons and a magnetic amplifier, while a dancing roller is situated in a loop in the material strip between the two reels.

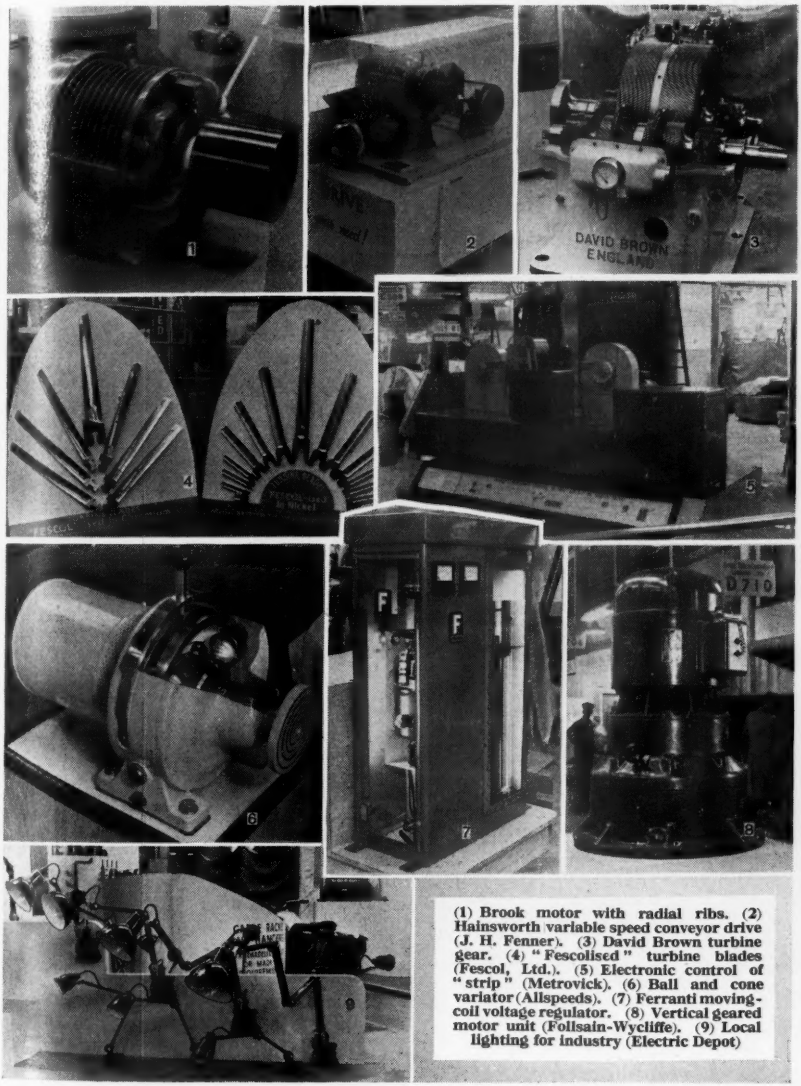
Another purely electrical control scheme is voltage regulation which is very well shown by Ferranti, Ltd., by means of a 50 kVA moving coil equipment of feeder pillar construction. It illustrates the application of the regulation to problems of voltage drop on long l.v. distributors. But the regulator is particularly applicable to the prevention of voltage troubles resulting from power cuts on supply schemes serving specific industrial equipments for which constant voltage is essential.

Another essentially electrical control scheme which we saw demonstrated by the Electric Construction Co., Ltd., is that of the continuity motor alternator set for maintaining the electricity supplies at the correct conditions for essential services such as telephones and radio-links. The scheme embodies a static alternator regulator, a static automatic synchronizing unit, and a static electronic speed control equipment. The alternator regulator operates with a standard exciter and alternator to maintain the alternator voltage within close limits. The synchronizing unit compares the voltage and frequency of the alternators to be paralleled, and checks the rate of frequency changes between the two sets. The speed regulator controls the machine when it is being driven by the d.c. motor. The d.c. motor speed is controlled by the electronic regulator to $\pm$ one per cent. The regulator receives a signal from a tachometer generator coupled to the main machine shaft and regulates the speed of the d.c. motor by field control. Normally the set is driven by the a.c. motor from the public supply. On the failure of the a.c. supply the d.c. motor-generator drives the set from the battery at controlled speed, thus maintaining constant speed and voltage. On the resumption of the public supply the a.c. motor again drives the set. We were assured by representatives of the Electric Construction Co. that the synchronizing principle could be applied to large power station alternators.

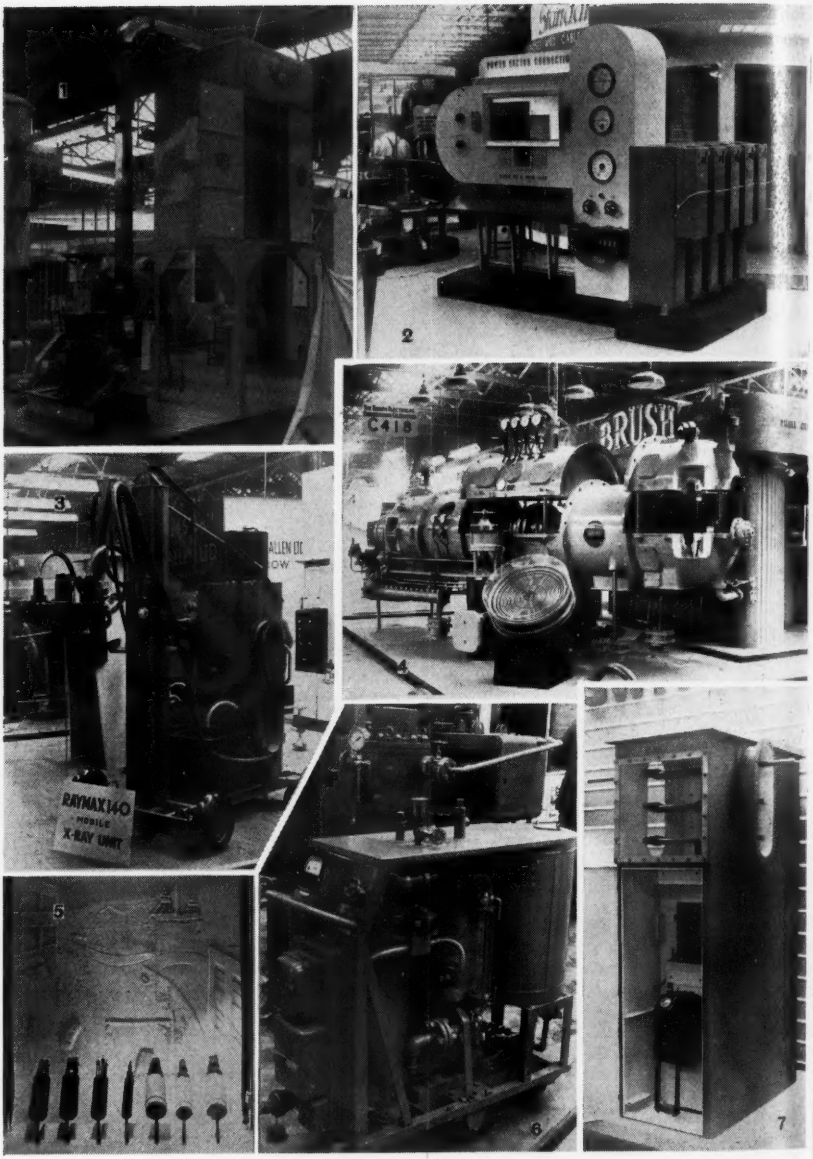
Electrical contributions to improved production, efficiency and economy in many ways are virtually limitless, and the following are just a few of the examples to be seen at the Fair: the new Brook motor, improved performance of which has resulted by designing the cooling ribs radially instead of longitudinally; the Newton Victor 140 kV mobile X-ray unit by which an accurate check is kept on the metallic structure and fabrication of such products as castings, sheet materials, rods and tubes; a Bastian & Allen "Speedylectric" for supplying a steam jet for cleaning all manner of production machinery and thus maintaining a high standard of production; the protection against oxidation and abrasion of such high-grade products as turbine blades by the electro-chemical deposition of protective metals such as chromium and nickel as depicted by Fescol, Ltd.; the demonstration by Standard Telephones & Cables, Ltd., of the value to the producer maintaining high power factor supply and its good effect on general production conditions; the marked influence on production of a high standard of lighting as depicted by the special adjustable local lighting units on show by the Electric Depot, Ltd. In referring to local lighting only we do not deprecate in any way the obvious contributions to increasing production of improved general lighting, of which there are to be seen a good many examples, but without specific reference to production.

Finally, to take the broadest view, all generation, transmission and distribution developments contribute to increasing production. We are reminded of this fact by the 2,400 kW Brush Ljungstrom turbo-alternator on the stand of the Brush Electrical Engineering Co., Ltd.; by the

Johnson & Phillips switch unit which is self-contained in a sheet steel cabinet so that supply can be made readily available to meet new production needs in places not well served with public electricity supply; and by the comprehensive cable display by British Insulated Callender's Cables, Ltd., one section of which is devoted to mining and general industrial cables.



(1) Brook motor with radial ribs. (2) Hainsworth variable speed conveyor drive (J. H. Fenner). (3) David Brown turbine gear. (4) "Fescolised" turbine blades (Fescol, Ltd.). (5) Electronic control of "strip" (Metrovick). (6) Ball and cone variator (Allspeeds). (7) Ferranti moving-coil voltage regulator. (8) Vertical geared motor unit (Follsain-Wycliffe). (9) Local lighting for industry (Electric Depot)

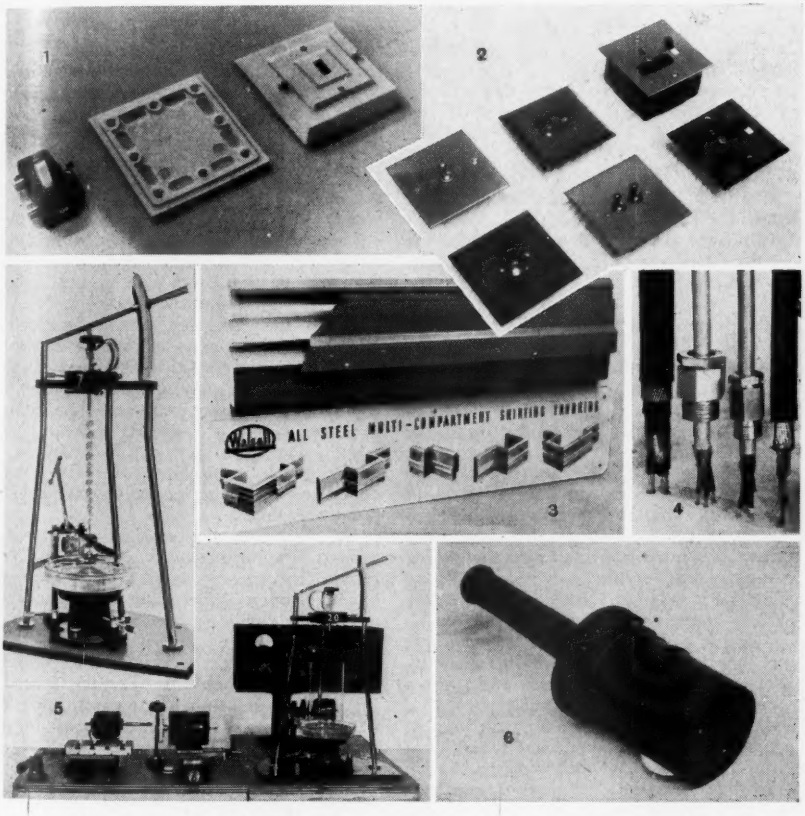


(1) Materials handling scheme incorporating fine grinding by Bramigk. (2) Standard Telephones p.f. demonstration outfit. (3) Newton Victor industrial X-ray unit. (4) Brush-Ljungstrom turbo-alternator. (5) B.I.C.C. mining and general industrial cables. (6) Bastian & Allen steam jet plant cleaning equipment. (7) J. & P. cabinet housed switch unit

Wiring and Accessories

PURCHASING for stock is a difficult business and can be greatly facilitated if the purchaser is able to examine a complete range of goods in order to make a comparative assessment. One of the most satisfactory ways of achieving this is by means of a trade exhibition. Although manufacturers' representatives may carry samples, or present catalogues, they are but a poor substitute for seeing the complete range of a particular maker, some of whom put themselves to amazing trouble to display their products attractively.

At Castle Bromwich, however, there was an inadequate presentation of those kinds of wiring accessories purchased



(1) Falk's surface switch that looks flush. (2) New range of Walsall standard box switching accessories. (3) Skirting trunking of Walsall multi-compartment design. (4) Callender's terminating gland connector for aluminium sheathed cables. (5) G.E.C. electric arc "drill" for perforating diamond wire-drawing dies (enlarged view inset). (6) New Metway domestic kettle connector

by the installation contractor. It is he who is most acutely aware of the user's criticisms; his invited comment might well bring forth mutually helpful suggestions.

Apart from steel conduit with an extensive range of fittings, Walsall Conduits, Ltd., make cable trunking as well as steel skirting trunking of multiple compartment design which on occasion might conveniently be employed for other industrial installations. Inside and outside angle units, and internal and corner buttresses, all line up neatly, while for doorways underfloor units are available for interconnection.

A new range of Walsall accessories has been made to fit into the same standard B.S. box: for example, a single-pole switch, or two-way multiple (two-ganged switches) can be linked as single-pole or one-pole and two-way; or a flat-pin or switched socket can all be accommodated in the same box. Once the latter has been fitted the interior switching can be altered without involving further cutting or chasing. All are interchangeable and available in brass or of shockproof design.

A surface switch which looks flush, for 5 A at 250 V a.c. only, is offered by Falk, Stadelmann & Co., Ltd., to avoid the extra cost of a sunk installation yet present a flush appearance. This "Surflush" switch has a short-break action between contacts of rolled silver and silver-plated phosphor bronze, the latter being "dimpled" to reduce flashing and pitting. Two screws hold it to the underside of the cover plate which, in turn, is attached by two more screws into eyeleted holes in the base plate. This plate has six alternative fixing holes for mounting direct on the wall without a block and eight knock-outs for t.r.s. cable entry from any direction. The two-gang type (vertical only) has a 3¼in by 5 in base plate and a sunk type with shallow or deep boxes is available if required.

The new "Nine-O-Nine" (catalogue No. 909) kettle connector displayed by Metway Electrical Industries, Ltd., has a sprung earthing disc on each side of a Bakelite body, making it adaptable to most collars. It also allows for some variation of pin centres for slightly differing pin diameters because the entry holes are oval, not round, while the flexible connecting cable is firmly gripped for anchorage.

Three consumers' service intake units were noticed, all cream coloured. In the G. P. Dennis case the moulded "Is..." cable intake at the bottom with coin-slot Landis & Gyr watt-hour meter and switch with porcelain rewirable fuse holders are contained in a sheet metal cupboard with hinged door, whereas the all-insulated .I. Callender's and the Falk, Stadelmann models consist of the three elements grouped on a base board.

Besides cable manufacturers represented on the C.M.A. stand, of much more modest character this year than last, cables and a variety of smaller types of insulated wiring are to be seen on about ten other makers' stands. Among them are B.I. Callender's aluminium sheathed cables with a new gland for terminating by screwing into steel conduit. The seamless aluminium sheathed Johnson & Phillips wiring and control cables are suitable for domestic as well as industrial surface installation. Single, twin, and multi-core types are made; they are insulated with rubber, or p.v.c., or similar materials of C.M.A. standard quality: 100 yd of twin 7/·029 weighs only 40 lb, very little more than the equivalent t.r.s. cable and less than half the weight of similar lead sheathed cable. Samples of insulated cables containing stranded aluminium conductors are to be seen on the Sterling, Falk (Wandleside Works) and B.I. Callender's stands while the display of Aerialite, Ltd., includes a circuit diagram and display board depicting a domestic ring main installation consisting of Nettle 13 A 240 V switched socket outlets and 7/·029 three-core flat "Ashathene" cable, which is insulated with a seamless concentric covering of polythene and a p.v.c. sheathing.

New uses for copper-clad mineral insulated Pyrotenax cable continue to be found. By drawing down a greater length of cable from a copper billet of the standard size, while retaining the same size of conductor core, more cable of smaller external diameter and lighter weight is produced. It is flexible enough to be used for suspending heavy industrial lighting fittings in situations where the pendant needs to be mechanically stronger than "flex" and resistant to corrosive atmospheres while the copper sheath serves to earth the lamp fitting when required. By substituting heating element cable for the reinforcing wire normally embedded in plaster decorative wall panels another outlet is created

for Pyrotenax cable. Up to 100ft of copper-sheathed conductor may be embedded in a space warming panel of this kind.

Lawn non-metal conduit of uniform bore which will not sustain flame, is offered by Ega Electric, Ltd., plain ended or screwed and can be easily threaded without the use of a vice or machine. It is p.v.c. based with added ingredients and considerably lighter than equivalent metal tubing. It can be bent by hand, when slightly warmed, to the usual radii, or shapes, and does not loop or tend to sag up to 150 deg F. Normal ⅝in, ¾in and 1in elbows, tees, boxes, etc., are made of the same material, which costs less than galvanized steel although a little more than enamelled metal. It is relatively non-hygroscopic and impervious to most acids.

An unusually wide choice of variously insulated conductors, bare wires and tapes is displayed by the London Electric Wire Co. & Smiths, Ltd., and its associates, including special wires for the radio valve and lamp making industries. Among the wire-drawing machines exhibited by Sir James Farmer Norton & Co., Ltd., are steel dies for the same purpose, but the use of diamond dies is essential for drawing the very fine tungsten and molybdenum wires needed for making lamp filaments.

The piercing of diamond dies for this purpose is now done by electric discharge arc "explosions" in an electrolyte as demonstrated on the G.E.C. stand without "burning" through. The positive needle point electrode is spring suspended vertically for vibratory make-and-break arc initiation.

The cold welding of aluminium has been known for some six years. It has been employed for sheathing power cables with aluminium and for making parts of induction motors, but its application to the fabrication of household aluminium ware, as demonstrated by the G.E.C., is an innovation. Instead of heating the metal parts to be united, they are subjected to very substantial mechanical pressure at the junction of the two edges, so that molecular "flow" results in a very homogeneous joint.

Depleted Domestic Display

TO those of us who remember the pre-war electrical displays at Castle Bromwich the representation of the domestic side of the industry this year is extremely disappointing. No doubt there are reasons for many manufacturers' reluctance to include domestic appliances among their exhibits or to give them great prominence. There is perhaps a tendency to regard the Birmingham section as purely industrial but we would prefer to see it completely electrical. Many visitors from abroad expect to obtain a comprehensive view of all British electrical equipment at Birmingham where the Electrical Section is situated and we certainly want them to see our domestic equipment—a remunerative class of export.

However, there are still a number of domestic items even though they are not all given prominence. Little cooking equipment is to be seen. We may include a pressure cooker displayed by L. G. Hawkins & Co., Ltd., although we regard a pressure cooker more as a special purpose utensil. At any rate this "Universal" model has a special machine ground flat base, 0·3in thick, so that it may be used economically on a solid electric hot plate. The internal fitting lid provides a safety seal and cannot be lifted off normally during a cooking operation.

Next in the cooking line is perhaps the "Robot" automatic toaster displayed by Falk, Stadelmann & Co., Ltd. It is a double rack (slice) equipment and is fitted with a clock mechanism which is set for the toasting time required by depressing a handle. This automatically switches on the elements, and at the end of the pre-set period the spring loaded toast carrier is released, raising the toast and switching off the elements.

There are a few fires about. A new imitation-fuel fire is the "Crestaberry" "Magicoal" unit in the display of Berry's Electric, Ltd. It has two 1 kW bar elements in separate horizontal reflectors at the top. The burning fuel feature at the base incorporates a flickering flame effect. W. T.

French & Son, Ltd., are showing the results of their efforts to overcome the chromium shortage problem. These take the form of 1 kW and 2 kW "Volcano" fires, a 1 kW pedestal fire and a 600 W bowl fire, all with polished aluminium reflectors replacing the original chromium ones.

One of the few domestic convectors to be seen is the "Vectair" on the stand of British Trane Co., Ltd. This has been remodelled with "streamlining" at the corners. Six sizes have loadings from 500 W to 3 kW. A 2 kW convector shown by Johnson & Phillips, Ltd., is attractive largely because of the horizontal arrangement of the gold anodized aluminium inlet and outlet louvres. The safety features of low temperature housings and inaccessible elements are stressed in connection with both of these convectors.

Water heating is represented at least by two exhibits—a 2·5 gall "New Look" storage heater by Berry's Electric, Ltd., and a range of immersion heaters by Bulpitt & Sons, Ltd. The Berry equipment represents another solution of a material shortage problem by way of its plastic outer casing instead of the sheet steel casing with which it was first introduced a year ago though not put into full production in that form. The Bulpitt immersion heaters will be on the market soon in 2 kW, 3 kW and 4 kW sizes in lengths up to 30in. The tubular elements proper are of the "Swan Rod" type which are used in some of the makers' kettles.

The only normal electric wash boilers we managed to find are on the stand of Burco, Ltd. The 10 gall round and square enamelled models shown are loaded at 3 kW and each has three-heat control by a rotary switch with or without automatic cut-out. There is also a new Burco 8 gall 2·5 kW galvanized boiler.

Of the electric washers on show a new "Goblin" rectangular machine (British Vacuum Cleaner & Engineering Co., Ltd.) is attractive in its white enamel finish and a new Burco power operated machine is available with or without a pump. The simplicity of the "Sturdy" power unit (agitator motion) may be seen on the stand of H. Fisher (Oldham), Ltd.

An English Electric refrigerator was described to us as the one "with the extra cubic foot." This model has a very fine finish and its actual storage capacity is 7·6 cu ft.

London Sections

As usual, most of the vacuum cleaners are this year to be seen at Earls Court, London, but the display is disappointingly small and there are very few new items on view. Last year ten firms were represented in this Section whereas this year there are only six, and one of these is showing only a non-electric floor waxer and polisher.

Among the new items is the Nu-Electrix "Plus" combined cylinder type vacuum cleaner and hair dryer. This appliance incorporates within the cylinder a heating element, which is controlled by a push-button switch associated with a red signal lamp, and is provided with separate hoses for hair drying and floor cleaning. When the cleaner is being used as a hair dryer the dust bag is removed and replaced by an air filter. This firm also has on show the "Handette" lightweight vacuum cleaner.

Among the exhibits of Bylock Electric, Ltd., is the new "Regency" vacuum cleaner which is attractively finished in gilt and includes among its accessories de-mothing and spray attachments. Other introductions are the "Centurion" cleaner, which has been developed to meet a demand for a moderate-priced machine, and the "Victor" thermostatic safety iron which is so designed that the soleplate automatically raises itself from the work when the hand is removed. This iron weighs 5 lb, incorporates a 450 W element and requires only a 2 oz pressure to hold it down on the work.

Apart from its washing machines and usual range of vacuum cleaners, Hoover, Ltd., has its new floor polisher on show and the British Vacuum Cleaner & Engineering Co., Ltd., is displaying its full range of "Goblin" domestic vacuum cleaners together with larger models designed for cinemas, schools, etc. New Welbeck, Ltd., is also demonstrating its range of products.

At Olympia the electric clock industry is represented in great strength. Apart from striking, chiming, alarm and other domestic clocks there is a good selection of industrial clocks, time switches, recorders and systems of synchronous "slave" dials controlled from a central master clock. Many of the products on view have been designed specifically for overseas markets. Most of the domestic decorative lighting fittings are to be found in the London Sections.

(1) British Trane convector. (2) English Electric refrigerator "with the extra cubic foot." (3) Johnson & Phillips domestic convector. (4) The new "Crestaberry" "Magicoal" fire. (5) Falk, Stadelmann "Robot" automatic toaster. (6) Hawkins "Universal" pressure cooker. (7) Wash boilers by Burco. (8) The new "Goblin" washing machine. (9) Polished aluminium reflectors replace chromium in these W. T. French fires. (10) The Fisher "Sturdy" washing machine power unit is very simple

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE South Western Electricity Board has appointed **Mr. L. Locker**, A.M.I.E.E., as district manager, East Cornwall, in succession to **Mr. J. H. Dent**, A.M.I.E.E.

After education at the Rotherham Grammar School and Technical College, Mr. Locker was employed by Rotherham Corporation Electricity Department until the outbreak of war in 1939, when he joined the Royal Corps of Signals. He was promoted to captain in 1943 and was mentioned in despatches for his work on communications in Malaya and Burma. In 1946 he rejoined Rotherham Corporation as mains assistant, and in 1947 was appointed testing and substation engineer to Bath Corporation Electricity Department. He was made senior technical engineer in the Cornwall Sub-Area in 1948, and became deputy sub-area engineer in 1950.

Mr. Dent was educated at Oldham Grammar School and the Manchester College of Technology. His 48 years' service have included the posts of chief assistant engineer, later deputy borough electrical engineer, at Loughborough, engineer and manager to Witney U.D.C. and the Gorseinon Electric Light &

Mr. J. H. Dent

Mr. L. Locker

Power Co., and, in 1936, engineer, manager and secretary of the East Cornwall Electricity Supply Co. After vesting day Mr. Dent continued to manage the South East Cornwall district, and following the revision of district boundaries in 1949, was appointed manager of East Cornwall District. Mr. Dent is not yet retiring from the service of the Board as he plans to spend some months on the reorganization of Sub-Area stores.

Mr. R. W. Ayers, managing director of Sciaky Electric Welding Machines, Ltd., has left for America on a six weeks' tour of industrial investigation. Mr. Ayers is on the committees of several industrial and technical associations, and is chairman designate for the International Institute of Welding from September next.

The Eastern Electricity Board has appointed **Mr. J. S. Mills** as its secretary in succession to **Mr. Arthur Bond** who recently took over the appointment of deputy chairman of the Yorkshire Electricity Board.

Mr. J. S. Mills

Mr. Mills was educated at Rossall School and at Victoria University, Manchester, where he obtained the degree of Bachelor of Laws (Honours) in 1935. At the final examinations of the Law Society held in June, 1937, he obtained the New Inn Prize with first class honours and the Rylands Brothers' Prize. From 1938 to 1948, with the exception of war service, Mr. Mills was on the staff of the Great Yarmouth Borough Council and was deputy town clerk from 1941 until he joined the Eastern Electricity Board in 1948. Since April, 1951, Mr. Mills has been deputy secretary of the Board.

After thirty-two years' service in the Industrial Sales Department of the British Thomson-Houston Co., Ltd., **Mr. J. W. Beswick** retired on 30th April. On demobilization after the 1914-18 war, Mr. Beswick joined the B.T.H. Co. at Rugby in 1920, where he has been in charge of the d.c. engineering section from that date until his retirement. Mr. Beswick was Mayor of Rugby for the year 1942-43.

Mr. L. C. Bingham, general sales manager of Venner, Ltd., is leaving for Holland to-day (Friday) and will be away until the end of June. In addition to visiting overseas distributors and supply undertakings in Holland, Mr. Bingham will visit Norway, Sweden, Belgium, France, Spain and Portugal.

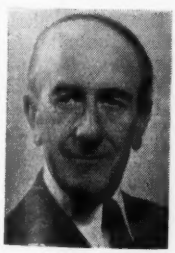
Mr. N. G. Lancaster, M.B.E., an assistant managing director of Tube Investments, Ltd., has been appointed executive deputy chairman of the group's aluminium subsidiary companies, T.I. Aluminium, Ltd., Reynolds Light

Allo[illegible] Ltd., Reynolds Rolling Mills, Ltd., and [illegible]e South Wales Aluminium Co., Ltd. Mr. **V. H. Bowman** and **Mr. J. H. Catling,** join[illegible] managing directors of Reynolds Rolling Mil[illegible] Ltd., Reynolds Light Alloys, Ltd., and the [illegible]uth Wales Aluminium Co., Ltd., have bee[illegible] appointed joint managing directors of T.I. [illegible]luminium, Ltd., the administrative and selli[illegible] organization of the Tube Investments alum[illegible]ium division.

It [illegible] announced by Johnson & Phillips, Ltd., that [illegible]eir engineer and manager for Scotland, **Mr. [illegible]. Gillespie,** M.I.E.E., retired on 30th Apr[illegible] He will, however, remain available for cons[illegible]tation. Mr. Gillespie, who is sixty-five, has [illegible]een with the company for 33 years. Afte[illegible] serving apprenticeships in electrical engin[illegible]ering and mechanical engineering (locomotive building) and receiving technical college training, he started his career as an electrical engineer with the British Electrical Plant Co., Ltd. Subsequently, he held positions with the General Electric Co., Ltd., Mather & Platt, Ltd., and Bruce Peebles & Co., Ltd. In 1919, Mr. Gillespie was appointed assistant branch manager for Johnson & Phillips, Ltd., and, in 1920, he became engineer and manager for Scotland, which position he has held up to the present time. He was associated with the early negotiations which led to the formation of the J. & P. Scottish group of companies (British National Electrics, Ltd., and Aurora Lamps, Ltd.). For some years, he was also responsible for the company's work in Northern Ireland and, until nationalization, was a director of the Dunoon & District Electricity Supply Co., Ltd.

Mr. Bruce Russell, M.I.E.E., succeeds Mr. Gillespie as engineer and manager for Scotland. He has had more than 30 years' service with J. & P. and is at present manager of the Edinburgh branch. Mr. Russell received his basic training with Bruce Peebles & Co., Ltd., and at the Heriot-Watt College, Edinburgh, and, during the 1914-18 war, served with the Royal Engineers. He is a councillor of the City of Edinburgh, a governor of the Heriot-Watt College and a national vice-president of the Association of Mining Electrical and Mechanical Engineers.

Mr. G. Gillespie



Mr. B. Russell

The appointment is also announced of **Mr. R. L. Stanley** as manager of the J. & P. Glasgow branch. An old Faradian, and a graduate of the Institution of Electrical Engineers, Mr. Stanley joined J. & P. in 1947 after serving with the R.N.V.R. (Electrical Branch). Subsequent to his training period with the company he was appointed as a technical sales engineer, London branch.

Mr. J. W. Woolley, A.M.I.E.E., retired last week from the position of consulting electrical engineer to John Lewis & Co., Ltd., Suburban & Provincial Stores and subsidiary companies. Mr. Woolley commenced his career with the West Ham Corporation Electricity Department in 1908, and from 1914 to 1928 was associated with shipping companies including the P. & O., the Orient Steam Navigation Co., and the British India Steam Navigation Co. He joined John Lewis & Co., Ltd., as assistant electrical engineer in 1928, became chief electrical engineer in 1930, and from 1944 has been consulting electrical engineer to the company. Mr. Woolley has been a member of the Batti-Wallahs' Society since 1934, and following the death of Mr. M. Whitgift early in 1948, acted as hon. secretary and treasurer of the Society for the remainder of that year.

Mr. J. W. Woolley

Mr. W. Jayne, Bristol Sub-Area commercial officer of the South Western Electricity Board, has retired after forty years' service in the electricity supply industry. He has been presented with a long-service certificate and with an adjustable table lamp by his colleagues. The presentation was made by Mr. E. C. Willis, manager, Bristol Sub-Area.

Mr. S. Baykurt, managing director of the Matas Trading Corporation, the distributors for Hoover, Ltd., in Turkey, recently visited the Hoover factories at Perivale, Middlesex, and Merthyr Tydfil, Wales, for business discussions concerned with the consolidation and expansion of the Turkish market. Following Mr. Baykurt's return to Turkey, **Mr. V. C. Mumford,** deputy export manager of Hoover, Ltd., and **Mr. R. V. Cable,** assistant divisional manager, flew to Turkey to continue the discussions.

Mr. R. L. Stanley

Mr. C. F. Nuttall, managing director of C. A. Newton & Co., Ltd., electrical engineers and contractors, Derby, has retired after forty years' service with the company.

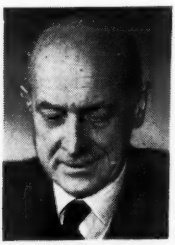
At the annual general meeting of the Exeter Electric Club held on 17th April **Mr. L. W. Cornish** was elected president for the ensuing year.

Mr. Fred J. Burns, employed by Cryselco, Ltd., as a sales representative in Liverpool and district during the past eleven years, has been appointed Liverpool branch manager in succession to the late Mr. Ken Mackley.

Mr. J. Miller has been appointed Scottish manager to the Progress Cables & Accessories Co., Ltd., in succession to **Mr. N. V. Blair,** who has left the company.

Mr. Harold Hobson has been appointed a director of the Calcutta Electric Supply Corporation, Ltd.

The first engineer to spend fifty years in the wireless industry is **Mr. R. D. Bangay,** of Marconi's Wireless Telegraph Co., Ltd., who celebrates his jubilee on 15th May. Born at Lyme Regis in 1883, Mr. Bangay joined the Marconi Co., and went to the Marconi College, Frinton-on-Sea, in 1902. Later that year he went to America for the company and, during the next five years helped to install many stations including the first U.S. coastal station at Babylon. On his return to England in 1907, Mr. Bangay began his study of wireless for military purposes, including the original experiments in air-to-ground communication. He later wrote the first wireless text book "The Elementary Principles of Wireless Telegraphy," which was followed by "The Oscillation Valve," both published in conjunction with the *Wireless World*. The experiments and developments he made in the military field led to the establishment in the Marconi Co. of a Field Station Department and he took it over, as chief, in 1914. In 1921 Mr. Bangay was appointed chief of designs and in 1925 he became the technical representative abroad. His present appointment of foreign manager was made in 1935.



Mr. R. D. Bangay

We have already reported the election of **Mr. D. D. Walker,** of Evershed & Vignoles, Ltd., as vice-chairman of the British Electrical & Allied Manufacturers' Association, and the appointment of **Mr. J. Oldroyd,** T.D., M.A., A.C.I.S., as secretary of the Association, and we now reproduce their portraits. Mr.

Mr. D. D. Walker

Mr. J. Oldroyd

Oldroyd was associated with the gas industry before nationalization, and had been with the Newcastle & Gateshead Gas Co., and the Croydon Gas Co. While with the Newcastle Co. he was also secretary of the North East Coast Coke Producers' Association. At the time of his appointment to B.E.A.M.A. he was assistant secretary of a large industrial organization.

The directors of the Telegraph Construction & Maintenance Co., Ltd., have presented **Lord Riverdale,** who resigned from the board in January, with a silver rose bowl as a token of friendship and gratitude for his services to the company. The bowl, which was designed by N. V. Bassant in conjunction with R. E. Stone, artist and craftsman in silver and Freeman of the Worshipful Company of Goldsmiths, was awarded first prize as an outstanding example in the competition held by the London Art Council in 1951. Facsimile signatures of the Telcon directors are engraved on the bowl.

Mr. H. G. Harlow, chairman of the West Yorkshire Branch of the **Electrical Industries Benevolent Association,** presided at a dinner and dance at the Astoria, Leeds, on 1st May, which will be an additional feature of the Branch's annual programme in the future. Mr. H. Senior Fothergill, secretary of the Association, was the guest of the evening. Mr. A. Bond, the recently appointed deputy chairman of the Yorkshire Electricity Board was present, and the attendance in general was widely representative of all sections of the electrical industry. The function was organized principally by Mr. J. R. Bardsley, hon. secretary of the Branch, Messrs. J. Plum, J. Sewell, J. Smith, and the chairman.

A happy evening was spent at Victoria Halls, Bloomsbury Square, London, W.C.1, on 3rd May, when the London Students' Section of the **Institution of Electrical Engineers** held their annual spring dance. Well over 230 people attended including Dr. J. Saxton (who is with the Radio Section of the National Physical Laboratory and is a member of the I.E.E. Council) and his wife. During the evening Mrs. Saxton presented the prizes to

the competition winners. Music was by Peter Wak and his orchestra and there were seve spot dances.

Several presentations have been made to Mr. **Bailey**, who has recently retired from the ition of control engineer at the Stoke-on-T generating station of the Midlands Elec ity Board. He has received a framed certi ate of long service and he has also been pres ed with an electric fire and a cigarette light by his colleagues.

Mr. **R. M. Fairfield**, B.Sc.Eng., M.I.E.E., M.I. ech.E., M.Amer.I.E.E., has taken up the position of director and general manager of W. T. Glover & Co., Ltd. Mr. Fairfield was born at Newcastle-upon-Tyne in 1911 and was educated at Llandaff Cathedral School and King Edward's School, Bath. He obtained his electrical training with the Newport Electricity Department and with Callender's Cable & Construction Co., Ltd.

Mr. R. M. Fairfield

During this period he took his engineering degree. After two years as research engineer on h.v. cables he spent three and a half years with the Mullard Radio Valve Co. as superintendent in charge of radio valve production. In 1937 he rejoined Callender's to take charge of the technical organization of the rubber cable factory at Leigh, Lancs, and in 1942 his responsibilities were extended to include the paper cable factory at Erith. Upon the amalgamation of the B.I. and Callender companies in 1945 he was appointed chief engineer (design and processes) responsible for the technical organization at the company's four factories, in which capacity he continued to serve until 1948 when he became director and general manager of St. Helens Cable & Rubber Co., Ltd.

Mr. Fairfield has served on the I.E.E. Transmission Section Committee and he was a member of the Committee set up by the Government during the war to advise on all technical matters relating to electric cables. He is a Fellow of the Royal Society of Arts. He was on the board of the Craigpark Electric Cable Co., Ltd., from 1945 to 1948, and he is a director and chairman of Veedip, Ltd., and a director of Rotunda, Ltd.

The E.M.B. Co., Ltd., has appointed **Mr. E. G. Holberry**, A.M.I.Mech.E., M.I.Prod.E., as works manager in succession to **Mr. J. Abberley** who recently resigned. Mr. Holberry has been with Wilkins & Mitchell, Ltd., for the last twenty-five years, and for the last few years as general manager.

For their first production the Amateur Dramatic Society of the staff of **H. Clarke & Co. (Manchester), Ltd.**, presented "The Camel's Back."

At a meeting on Monday last the **Yorkshire Electricity Board** made the following appointments:—Mr. C. Booth (sub-area manager, Y.E.B.) to be manager of the Huddersfield Sub-Area in succession to Mr. F. A. Ellis, who has joined the Southern Electricity Board; Mr. C. Cameron-Kirby (deputy-sub-area manager, South Eastern Electricity Board) to be manager of the Hull Sub-Area in place of Mr. D. Bellamy, now chairman of the Y.E.B.; and Mr. B. D. Youatt (section head, chief engineer's department, Y.E.B.) to be manager of the Leeds Sub-Area, to succeed Mr. F. Nicholls, who has retired.

Mr. W. F. Randall, director of the Telegraph Construction & Maintenance Co., Ltd., was to sail in the *Queen Mary* for the United States yesterday on a business trip in connection with the supplies of raw materials. He expects to be away for about a month.

The manager of the Suffolk Sub-Area of the Eastern Electricity Board **Mr. H. J. Wright**, M.Eng., M.I.E.E., M.I.Mech.E., is resigning and will shortly be sailing with his wife and family to settle in Canada. Mr. Wright was formerly a member of the Edmundsons organization having been deputy to the general manager of the East Anglian Electric Supply Co., the Bedfordshire, Cambridgeshire and Huntingdonshire Electricity Co., and the Newmarket Electric Light Co. For several years he was chairman of the Karachi Electric Supply Corporation, Ltd.

Mr. H. J. Wright

OBITUARY

Mr. R. G. Ward.—The death is reported at the age of eighty-two of Mr. Richard Gibbs Ward, M.I.E.E., who for many years, until his retirement, was associated with John Brown & Co., Ltd. Mr. Ward was chairman of the Sheffield Sub-Centre of the Institution of Electrical Engineers for the 1928-29 session, and chairman of the North Midland Centre of the Institution in 1931-32.

Mr. J. H. Millen.—The death occurred on 30th April at Deal of Mr. James Henry Millen, M.I.E.E., former chief electrical engineer of the London Passenger Transport Board. Mr. Millen commenced his career with the Dublin tramways and in 1903 became chief assistant during the construction of the Lots Road power station of the London Underground Railway

Companies, with whom he subsequently became superintendent of power and later electrical engineer. In January, 1934, he was appointed chief electrical engineer to the London Passenger Transport Board, from which position he retired in 1938. During the war Mr. Millen was labour supply officer for the Aberdeen District Man-Power Board, and later served on the Control Commission for Germany, and as regional controller with the Ministry of Fuel and Power, London.

Mr. Wilfrid Randell.—We regret to record the death on Sunday last of Mr. Wilfrid L. Randell, consulting editor. For some years Mr. Randell was editor of the *Academy* and a frequent contributor to the leading evening papers. He subsequently joined the G.E.C. publicity organization and in 1923 succeeded the late Mr. Adam Gowans-Whyte as editor-in-chief of Electrical Press, Ltd., from which position he retired in 1936. His hobby was clocks and he wrote a number of books and articles on the subject. Mr. Randell was a popular figure at electrical gatherings and will be greatly missed by his Press colleagues.

Mr. John Turner, aged fifty-six, station superintendent at Burnley, died on 18th April. Mr. Turner served his apprenticeship with the Burnley Corporation Electricity Department, and was in turn switchboard attendant, shift charge engineer, operation engineer and station superintendent, in which post he succeeded Mr. W. Blythe who was recently transferred to Padiham.

Mr. Wilfrid Hall, a shipowner and electrical engineer who founded the Hexham Electric Supply Co., has died at Tynemouth at the age of seventy-eight.

WILLS

Mr. W. Riggs, M.B.E., M.I.E.E., chairman of Girdlestone & Co., Ltd., and associated companies and a past president of the Electrical Contractors' Association, who died on 10th November last, left £32,875 gross (£30,556 net).

Mr. C. R. Palmer, for many years managing director of the International General Electric Co., Ltd., in India, who died on 17th December last, left estate in Great Britain valued at £9,554 gross (£9,365 net).

Mr. W. G. Groocock, formerly for 20 years manager of the B.T.H. Birmingham works, who died on 25th January last, aged 81 years, left £14,533 gross (£14,465 net).

Mr. H. D. B. How, a founder-director of the Hallamshire Electric Co., Ltd., who died on 12th February last, left £25,550 gross (£25,080 net).

Mr. C. E. D. Greenhalgh, M.I.E.E., late engineer and manager to the Ilkley U.D.C., who died on 11th July last, left £2,483 gross (£2,379 net).

Cavitation Research

CAVITATION and its relation to the design of hydraulic equipment was the subject of the James Clayton Lecture recently delivered at the Institution of Mechanical Engineers in London. The lecturer was Prof. R. T. Knapp (Professor of Hydraulic Engineering, California Institute of Technology, Pasadena) who first briefly mentioned the effects of cavitation and then defined that term. The lecture was instructive to designers of water turbines for hydro-electric generators although it was limited to an examination of experimental findings concerning the mechanics of cavitation and their design implications. The manner in which cavitation can cause damage to plant and the relative resistances of different materials to such damage was not considered, hence such equipment as magnetostriction apparatus was not described.

The major part of the lecture was devoted to descriptions of experimental investigations and included illustrations of severe damage to a pump impeller, a Francis turbine runner, tip cavitation, etc., as well as of investigational equipment employed, including high-speed motion picture photography and multi-flash photographic equipment. The flash lamp system was said to require a continuous input of 20 kW. However, as the lamp was burning for only 1/25th of the total time the energy input to it during the exposurewas at the rate of 500 kW.

The lecture concluded with some observations on the prevention of cavitation and the prediction of performance from laboratory tests.

F.B.I. and Purchase Tax

A MEMORANDUM on purchase tax has been submitted to the Chancellor of the Exchequer by the Federation of British Industries. After surveying the operation of the tax it reiterates its previous requests that an immediate review should be made of the effect of the tax on industry and export and that an advisory committee should be established to examine particular instances of the injurious effect of the tax and to advise the Chancellor on proposed remedial action.

Eastern Board's Headquarters

REPLYING to Mr. Hare in the House of Commons on Monday, Mr. Lloyd, Minister of Fuel and Power, said that the Eastern Electricity Board bought Wherstead House for £20,000 in 1948. The building was extended and repairs were necessary owing to damage by death watch beetle and dry rot. The total spent, including purchase, was £103,500. He was informed that the work had been completed within the amount authorized by his predecessor.

Industry and the House

Purchase Tax, Transport and Exports

By T. F. COOK, M.P.

THE House was keyed up for the second reading of the Finance Bill but the anticipation was greater than the realization. It had been expected that Mr. Butler would make some pronouncement about purchase tax, but with all the skill at his command he avoided any definite indication which might have allowed those with large stocks of goods to have at least one night's sleep and kept them still in suspense. The House felt that sooner or later the Chancellor would have to decide. Neither in the second reading debate nor in the debate on purchase tax did Mr. Butler reveal his hand. While he had built himself a big reputation over the past few weeks the general feeling was that it was rapidly being dissipated on this issue.

Co-ordinating Ministers

The surprising statement by Lord Woolton that the work of the co-ordinating Ministers was a responsibility not to Parliament but to the Cabinet created some stir in the House of Lords. Lord Shepherd, Chief Whip for the Opposition, asked if the Government agreed with this view and then, surprise of surprises, the Marquis of Salisbury, Leader of the House, replied that what Lord Woolton had in mind was that the co-ordination of the work of the departments was a function within the Government—an allocation of duties by the Prime Minister for purposes of administrative convenience. It did not affect the direct responsibility to Parliament of Departmental Ministers nor did it affect the long-established ministerial responsibility to the Crown and Parliament. On being challenged Lord Salisbury said he would study the matter, and would give the House (the Lords) his considered opinion.

Lord Stansgate contended that this statement had created a new class of Minister who was not responsible to Parliament. Thereupon Lord Woolton intervened to say that he had answered the question without previous notice and that he thought he had stated a clear Parliamentary principle which Lord Stansgate might well have accepted. This rather disturbed not only the Lords but also the House of Commons as striking right at the centre of the constitution.

The Commons, after a dreary start, has begun the long and tiresome trek through the Finance Bill. While the members have rather mixed feelings about the whole business, it regretted the haste with which the Government introduced the guillotine to deal with the Health Bill.

Some consternation was caused by Mr. Churchill's incursion into the transport field. Almost without exception members are asking how transport is to pay its way in the light of the new situation without subsidy. The House is quite convinced that more will be heard about this subject. In the absence of the Minister of Transport (Mr. Maclay), who should have been in the thick of this business, through ill-health, this affair was in the hands of Sir David Maxwell Fyfe, who is not only Home Secretary and Minister for Welsh Affairs, but has to deal with all the difficult situations which arise.

In his defence of the Government's intervention in the fares increases, Sir David Maxwell Fyfe made the most of the submission that disproportionate increases in existing sub-standard and concession fares must bear unduly harshly on the people concerned. This claim of hardship has a very obvious and simple appeal. But it does not answer the serious objections there are to a decision that these concessions should be permanently maintained.

Legislative Programme

It now seems quite clear that the Government will have to drop most of its contentious legislation as there is no possibility of getting it through the House in this session unless it is prepared to extend the session right to Christmas without a break. It is being proved beyond doubt that any

Government with a major programme needs a majority of at least fifty in order to make use of the machinery of sending major Bills to committees while the House gets on with routine business.

The full effect of the Australian import cuts are now being felt in this country and behind the scenes a big legal fight is developing as to whether contract cancellation on the scale already carried out is legally correct. That apart, effects of the Australian decision are having far reaching consequences and many firms must be wondering with some trepidation what will happen when India and South Africa announce their schemes. More and more it is becoming obvious that the Prime Minister should set about calling a Commonwealth Economic Conference. Everyone feels that this has become one of the key issues to our future economic survival as a strong unit of the sterling area.

To add to the welter of difficulty we have Japan being accused of flagrantly copying British designs and styles and American manufacturers at the same time demanding tariff protection for their home produced goods against British exporters. Are we moving in to another tariff war with all its disastrous consequences for the participants or is this another aspect of the presidential election battle?

No article of this kind would be complete if it did not make some reference to the passing of one of Great Britain's strongest men, Sir Stafford Cripps. In paying his tribute the Prime Minister once again proved himself the master of the correct phrase. The House was deeply moved by the simplicity and sincerity of his tribute.

Freedom of Choice

WRITING in *The Times* on Monday Lord Brabazon, a past-president of the Electrical Development Association, recalled the pre-war competition between gas and electricity which in his view was healthy and stimulating to both industries. Now that coal, gas and electricity had been nationalized, he said, the servants of these industries were so "civil" and competition was so abhorrent that all was to be planned by Lord Ridley's Committee.

Remarking that, from the publicity given to certain statements submitted to the Committee, he noticed that coal and gas had become associated powers against electricity, Lord Brabazon added "Obviously we are in for another 'plan' whereby an all-wise committee will tell us how, and by what means, we are to warm ourselves, and electricity will not be allowed to heat our rooms, cook our food, or to heat our water. Another freedom will be gone—namely, that of each individual to choose the fuel and the appliances most suited to his needs." After referring to the fact that information was used for electricity generation, Lord Brabazon said he had always thought that electricity should be "cheap and abundant" whereas it had become "dear and deficient."

In a reply published on Tuesday, Lord Citrine, chairman of the British Electricity Authority, said that in general most people in the industry would agree with Lord Brabazon's views, but he denied that the B.E.A. regarded competition with coal and gas as abhorrent. With regard to the allegation that electricity was "dear and deficient," he referred to the 1951–52 report of the B.E.A. which showed that many users paid less than before the war, while as to deficiency, the general output was twice as much.

International Codes

THE International Electrotechnical Commission (IEC), which is affiliated with the International Organisation for Standardisation (ISO), has issued a colour code for fixed resistors (Publication 62) as used in radio-communication equipment. It is the outcome of the 1947 Lucerne recommendation to revise Publication 58 acted upon in Stockholm in 1948 and accepted in Paris in 1950, identifying both values and tolerances. The first edition of Publication 63, which was proposed in Stockholm in 1948 and accepted in Paris in 1950, sets out a series of preferred values with associated tolerances for resistors and capacitors.

It was in 1925 that the IEC appointed Advisory Committee No. 6 for the standardization of lamp caps and holders with the object of securing international interchangeability. This Committee profited by the co-operation of the Independent Committee on Standardisation of Lamp Caps and Holders (INDECO) until the war stopped activities. In 1947 a committee formed of representatives of the former INDECO countries, excluding Germany, but with the addition of representatives from the U.S.A. and, later, Sweden, eventually submitted proposals. These have been approved as the first edition of Publication No. 61 embodying IEC recommendations for the standardization of lamp caps and holders in general use to-day for circuits up to 250 V, together with gauges suitable for ensuring interchangeability. The types of gauge illustrated are not necessarily the only forms of gauge that can be made.

Copies of these documents are obtainable, price 2s 3d post-free (Publication 63) and 11s 4d post-free (Publication 61), from the British Standards Institution, 24, Victoria Street, London, S.W.1.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

"Better Installations"

No one will disagree with the writer of the article "Better Installations" (18th April) when he wishes for the standard of electrical installation to be raised, but it does seem that his method of doing so indicates a negative approach to the problem.

It is suggested that contractors who were not, for some reason, on the roll of the National Inspection Council should, under pain of prosecution, be required to submit all their work for inspection. And what if the installation did not pass inspection? Presumably the faults would be rectified and the work reinspected; in other words things would be much as they are at present when the Area Boards carry out this task. Surely it would be better to take steps to ensure that operatives did not make mistakes, which can only be done if they are given incentives to further their technical knowledge.

An electrical installation may be unsatisfactory because it does not provide an adequate service or is badly executed. The reason for inadequate installations can usually be found in the offices of the architects. These worthy folk seem, in general, to be abysmally ignorant of electrical matters and, for the average house, adopt a one-room-one-light-one-socket outlet specification, a system which causes socket outlet adaptors and spider webs of flex to sprout from the region of every fireplace. So a first step is to ensure correct planning of the installation.

Bad workmanship, however, can only be the fault of the operative and is usually due to an incomplete knowledge of the technology of installation work and, in very many cases, a distressing ignorance of the I.E.E. Regulations.

The abolition of Category III labour and the consequent requirement for all apprentices to attend "day release" classes will do much to improve the standard of work in time, but the problem of the older operative can only be solved by providing incentives for them to further their knowledge. These could take the form of rates of pay graded for various qualifications, or by a registration scheme.

Finally, should there be compulsory registration of contractors? In my opinion definitely yes. Too often one sees an advertisement something like this:—"J. BLANK: Bricklayer & Carpenter; Painting & Decorating; Electrical & Sanitary Engineer."

No one thinks that the form of registration imposed on doctors or dentists is a negation of freedom. Why then should a similar standard for electrical installation contractors and operatives be frowned upon?

GEOFFREY S. CHAPMAN, A.M.I.E.E.

Hastings.

[The letter on "Alternative Systems of Wiring" published in our issue of 18th April was from Mr. J. C. Elvy (not "J. E." as printed). —Editors, *Electrical Review*.]

STREET LIGHTING NOTES

DARLINGTON Town Council has approved a revised estimate of £8,783 for sodium vapour lighting in Coniscliffe Road. The borough engineer is also to prepare a scheme for improving the lighting in Haughton Road.

Consideration of a £30,000 street lighting improvement scheme at BLACKPOOL has been deferred by the Finance Committee pending the preparation of a joint report by the borough treasurer and the illuminations and street lighting officer. The proposals, recommended by the Highways Committee, provide for the replacement of 700 gas lamps at all-night lighting positions by electric lamps. It is estimated that there would be an annual saving of £5,000, so that the capital cost would be recovered in six years.

LEEDS Corporation has received the sanction of the Ministry of Transport to install 250 Group A tungsten filament street lamps on 4½ miles of main traffic routes.

BILLINGHAM-ON-TEES U.D.C. is to spend £7,200 on the provision of public lighting on trunk road A.19 and also from Billingham Bottoms to Sandy Lane.

Lake Drilling Barge

Self-Contained Diesel-Electric Craft

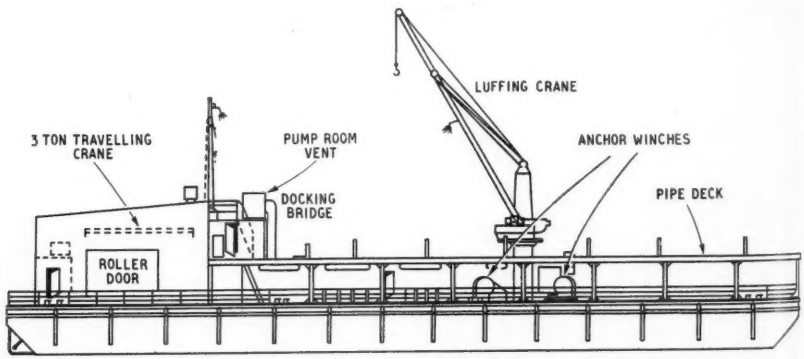
TO facilitate oil-well drilling operations in the deeper waters of Lake Maracaibo, Venezuela, a diesel-electric power barge has been built in Great Britain for the Shell organization. Although not an entirely new departure, it is the first craft of its type to be built and equipped in this country.

The barge will contain main and ancillary equipment with sufficient materials to make it a self-sustaining power unit for thirty days' drilling operations without replenishment of consumable stores. It was constructed, largely by welding, to Lloyd's Class A requirements. Except for a forward ramp-end, to ease mooring near the drilling rig platform, the underwater portion of the hull is rectangular box-shaped, 158ft long and 80ft broad, of 2,545 tons displacement, for use in conjunction with a piled steel structure permanently erected at each well site.

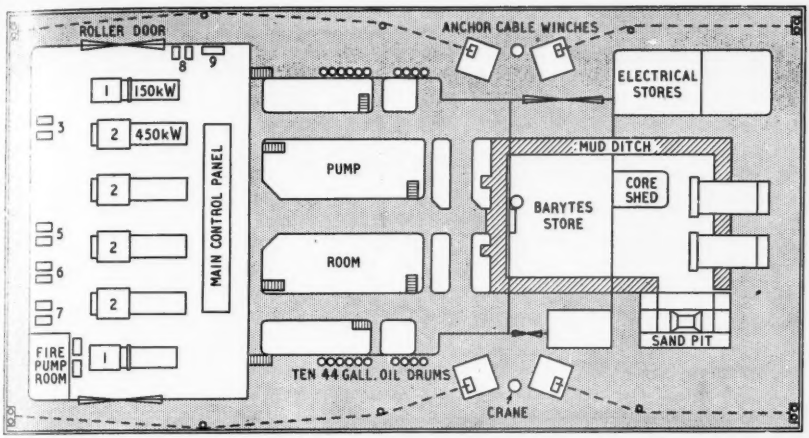
There is a motor driven electric luffing crane of 3 tons capacity at 25ft radius on each side of the pipe deck. For mooring purposes there are four electrically driven anchor winches on the main deck, one pair on each side. Dual control will permit operation from either the platform on the pipe deck or the winch stations. The winches are by Woodfield Hoist & Associated Industries, Ltd.

The engine room aft of the main deck has sliding doors on the port and starboard sides with a 3-ton overhead travelling crane athwart ship to assist maintenance and overhaul of the main generating plant. The latter consists of four 12-cylinder V-formation, pressure charged 4-stroke diesel engines operating at 650 r.p.m., each directly coupled to a 450 kW d.c. generator. The larger main engines are fitted with turbo-chargers and have a normal 12-hour rating of 910 b.h.p., or a continuous rating of 698 b.h.p. when allowing for site temperature and humidity. In addition two auxiliary generating sets are provided, each consisting of a 7-cylinder normally aspirated vertical diesel engine operating at 600 r.p.m. directly coupled to a 150 kW a.c. and 20 kW d.c. generator in tandem. The smaller engines have a normal 12 hour rating of 367 b.h.p. and under site conditions will have a continuous rating of 281 b.h.p. The engines are by Mirrlees, Bickerton & Day, Ltd., while the main and auxiliary generators as well as all motors were supplied by the Metropolitan-Vickers Electrical Export Co.

Starting of the engines is by air at 300 lb/sq in and two compressors are included, one diesel driven at 1,000 r.p.m. for intermittent duty only as normally required for charging air receivers, the



Elevation of power barge for oil-well drilling at Lake Maracaibo, Venezuela



General plan of the power barge at main deck

other electric-motor driven at 575 r.p.m. for continuous duty with automatic unloading device.

The engine fresh water enclosed cooling system is equipped with two heat exchangers (one standby), each of sufficient capacity to deal with all engines running simultaneously. The Serck heat exchangers are of monel metal construction with gunmetal water boxes to counteract the highly corrosive properties of the lake water which will be used for heat extraction. Duplicate fresh and lake water circulating pumps are provided, all four pumps being identical in design and each capable of handling 45,000 gall/hr. Engine safety devices include visual and audible alarms against failure of cooling water, rise in cooling water temperature and against failure of the lubricating oil system. These alarm panels are by F. Bamford & Co., Ltd.

The main 450 kW d.c. 450 V (f.l.)/520 V (n.l.) variable voltage generators are designed to give the full load output at 450 V; each has two fields, a shunt field separately excited from a pony-mounted Amplidyne exciter and a differential series field. This combination gives the required form of drooping characteristic to provide the necessary flexibility of controls to the connected d.c. motor and automatic protection against overloading the engine. Each Amplidyne exciter is equipped with a control field, a current limiting field, an equalizing field and an anti-hunt field. These fields are also utilized in a " suicide " circuit to kill residual voltage and bring motors to a standstill when the master switch is in the " off " position. The Amplidyne exciters are by the International General Electric Co.

The two auxiliary a.c./d.c. generating sets supply a.c. at 440 V, 3-phase, 60 c/s, to the various auxiliary motors, including circulating water pump motors, blower motors, etc. The tandem mounted d.c. generator on each auxiliary set is for 250 V field excitation of the main d.c. motors. Although one of the auxiliary generating sets is intended to serve as a standby, provision is made for the paralleling and synchronizing of both sets for simultaneous operation should additional power be required. Transformers incorporated in the M-V auxiliary panels step down the generated a.c. to 110 V for barge and derrick lighting purposes and for comparison voltages for the Amplidyne exciters.

Each generator is equipped with " drill-hoist " contactors which are under the control of their associated " drill-off-hoist " selector switches on the driller's panel. Thus from one to four generators may be transferred from drilling to hoisting by operation of their respective selector switches. When these selector switches are in the " off " position, neither the hoist nor the drill contactor will be closed. This main control gear is by the International General Electric Co.

Below the main deck of the barge are three variable speed d.c. motors, two of 800 h.p. suitable for a speed variation from 720 to 72 r.p.m. They are each independently connected through a 2in pitch quadruple chain drive to the two main mud pumps which handle the mud flush requirements to the rig during drilling operations.

On the port side of these two pumps a 300 h.p. motor with a speed range of 750 to 75 r.p.m. is directly coupled to a high pressure multi-cylinder pump for cementing operations.

A 150 h.p. motor having a speed range of 900 to 90 r.p.m. is coupled by a V-belt to an auxiliary mud pump installed on the starboard side of the main pumps. A second identical 150 h.p. motor drives the coring reel unit on the top deck of the barge. Speed variation of these motors is obtained by generator voltage control.

There is a central blower equipment, with a duplicated stand-by set, capable of handling approximately 18,000 cu ft of air a minute for the ventilation of the main d.c. motors, except the 300 h.p. motor which will be forced ventilated by an individual motor driven blower. The Keith Blackman central blower equipment will also take care of the ventilation requirements of the barge.

Air compressors and water pumps are by the Hamworthy Engineering Co., Ltd.; slush pumps by the National Supply Corp. (U.S.A.) and British Oilfield Equipment Co., Ltd.; high pressure cementing pumps by the Gardner-Denver Co. (U.S.A.) and the shale shakers by Niagara Screens (Gt. Britain), Ltd.

In addition to the foregoing, two d.c. motors will be installed on the drilling platform, namely, the draw-works motor with a normal rating of 800 h.p. and similar to the main mud pump motors; and the rotary table motor, rated at 300 h.p., with similar characteristics to the high pressure cement pump motor. These two motors are forced ventilated by individual electric motor driven blowers regardless of speed and permit safe air to be supplied when gaseous conditions are encountered.

During drilling operations the barge can be moored near the permanent drilling platform, which in itself is of novel construction. On this piled substructure above water level a structural steel platform will accommodate the base drilling derrick, draw-works, rotary table and their associated electric motors, etc. Flexible cables and control lines from the power barge to the drilling platform will supply power to the motors on the latter and also provide the driller with remote control of certain equipment on the barge. For example, the two 800 h.p. mud pump motors will each have a master switch at the draw-works position and on the barge, permitting control from either station, but not simultaneously from the points. On both the derrick platform and barge are panels with plug receptacles to receive the coupler plugs of the interconnecting power cables and control lines. A telephone system between the drilling platform and the barge will permit the driller to have direct contact with seven principal operating stations on the barge and communication with shore headquarters will be maintained by radio.

This mobile power barge in conjunction with the drilling platform will be capable of drilling to depths of 15,000ft in the deepest waters of the Lake 15 miles or more from the shore.

The barge hull was built by Ferguson Brothers (Port Glasgow), Ltd. Selection of diesel-electric power, as opposed to steam generating equipment, has, despite the greater initial capital outlay, avoided the feedwater problem and the fire hazard which exist when steam raising equipment is used in close proximity to oil drilling operations. The flexibility and ready means of disconnecting the power cables and control lines between the barge and drilling platform are a considerable advantage in bad weather or other emergency.

Munich Electrical Fair

THE fourth Munich Electrical Fair will be held from 20th September to 5th October. It will be representative of electricity generation, transformation and distribution; appliances for industrial and domestic use; instruments and appliances for the transmission of news; measuring and control instruments; lamps and tubes; electrical equipment for vehicles; electro-medical apparatus, etc. There will also be special exhibits of educational interest, embracing the development of electro-technical processes and their application in industry. The fair is international in character and British firms are invited to participate. Further details can be obtained on application to Münchener Elektro-Messe, Theresienhohe 14, München, 10.

BRISTOL PORT OPERATION

Increasing Power Requirements

Left: **Battery of 3-ton electric luffing cranes at Avonmouth Docks.** *Right:* **Night loading of cars and tractors for export; sodium vapour lighting makes the work safer and easier**

THE Port of Bristol, which in many ways was a pioneer in the industrial use of electricity, is to-day virtually all-electric and the rising demand for power is a measure of the increasing trade and prosperity of the docks at Avonmouth, Bristol and Portishead. Power requirements have doubled since 1936 and now the Port of Bristol is taking nearly 41 million kWh a year from the South Western Electricity Board for the operation of the docks and to meet the needs of industrial tenants.

In view of the expansion in the industrial area of Avonmouth Docks, the Electricity Board is planning to augment the 33 kV system in the district at a cost of about £63,000 over two years and other big capital schemes will be necessary to provide power for industrial development at Portishead.

At Avonmouth two centrifugal pumps totalling 1,300 h.p. keep the water level in the docks about 50ft higher than low water in the Bristol Channel. These "impounding" pumps are the largest consumers of power at the docks and can pump nearly 100,000 gallons a minute. The lock gates at Portishead and Avonmouth Docks are electrically operated, the Avonmouth lock entrance being a pioneer installation of its kind and replacing the almost universal hydraulic operation of lock gates.

The use of power to provide increased mechanization has been an important factor in the progressive improvement in the handling of cargoes over many years. The Port Authority was one of the first users of electric cranes of which there are now 72 at Avonmouth and 31 at the City Docks. An erection programme nearing completion includes 28 electric cranes at Avonmouth and eight at Bristol, most of which are over 130ft high and have electrically heated cabins. The great height and length of jib—they are among the tallest in the country—enables a dock-side crane to unload from a ship into barges on the opposite side of the vessel. Cargoes are speeded on their way by a large number of stackers, pilers, elevators and conveyors.

A large fleet of trucks, including the electric fork-lift truck type, ensures rapid handling of cargoes from quayside to sheds. The batteries are charged at night, so assisting the electricity supply system. Suction elevators of 130 h.p. each and with a capacity of 80 tons/hour, transfer grain from ship to shore, operating like huge vacuum cleaners. Eight miles of conveyor belts move the grain to the granaries.

The port's export trade has been very brisk recently, and the reconstructed X Berth at the Royal Edward Dock has been fitted with sodium vapour floodlighting to facilitate the night loading of motor-cars, buses and tractors.

Another important use of electricity is for opening and closing the oil boom which seals off the oil berths from the rest of the docks and prevents the spread of any floating oil. The boom is "jet-propelled," an electric pump drawing water from the oil basin and ejecting it to push the boom to one side. The electrical equipment and cables are flameproof to avoid fire risk.

Electric refrigeration plant at Avonmouth, essential for the storage of meat and other perishable foodstuffs, includes remote indicating thermometers which show the temperature in any of the refrigeration rooms. Electric thermometers are buried in the soil under the cold store to give early warning of soil freezing which could, if neglected, cause structural damage to the building.

At Walton Bay, which is the main control point for shipping entering the port, a windmill generator is used as a standby to the mains electricity for operating the signal lamps.

New Lighting Techniques

Lecture to E.P.E.A.

IN a lecture to the Electric Power Engineers' Association, London Technical Group, Messrs. H. R. Ruff and R. V. Mills (B.T.H. Co.) explained, with the aid of demonstrations and lantern slides, the principles of new electric discharge and fluorescent lamps, discussing problems that still awaited solution. They showed how these lamps had contributed to the development of good lighting practice and made possible new uses.

Although, they said, the most spectacular development had taken place in the discharge lamp field, steady progress had also been made with incandescent sources. Two examples were shown: the construction and applications of accurately prefocused internal reflector lamps and the good diffusion and high efficiency of the silica coated lamps.

The authors demonstrated the construction of types of mercury and sodium vapour discharge lamps, explaining how the development of special glasses had made each possible. Further developments of the mercury vapour source had resulted in high efficiency, high brightness, compact-source projector lamps and lamps which were a convenient source of long wavelength ultra-violet energy. The audience was shown how the bright-source lamp could be used for industrial and laboratory projection work. Film strips were exhibited illustrating the use of the colour modified mercury cadmium compact-source lamp in the taking of cine-colour films. The use of the fluorescence of natural and synthetic fluorescent materials to provide long wavelength ultra-violet light for industrial and decorative purposes was demonstrated with 125 W "black" lamps.

Low-pressure mercury lamps were efficient sources of short wavelength ultra-violet energy, making possible a new range of light sources. Characteristics and construction of fluorescent lamps were described and hot-cathode and cold-cathode lamps were shown in operation, as applied to exterior and interior lighting installations. Their use had introduced to interiors an era of "large area lighting" and details were given of their advantages for improved lighting for streets, transport and mines.

The almost unlimited range of colours possible with fluorescent lamps had introduced new problems of colour measurement and standardization, and the difference between colour appearance and colour rendering was illustrated.

A new range of chemical flash lamps and electronic discharge lamps for photography had been developed and shadow "photographs" of fast moving objects, using phosphorescent screens, were taken to illustrate the time of flash of the two types of lamp. Examples of the use of discharge lamps for stroboscopic examination of recurrent motions, such as occur with rotating machinery and reciprocating mechanisms, concluded the lecture.

Commerce and Industry

Improved Metal Position

Shunting Locomotives for British Railways

At the annual meeting in Toronto last week of the International Nickel Co. of Canada, Ltd., the chairman and president (Dr. J. F. Thompson) spoke of the company's greatly increased production of nickel and the effect of restrictions upon its use. He said that new market developments had had to be curbed and ultimately these conditions would impose upon their sales and development departments the burden of readjustment and re-establishment of normal industrial uses. This would require a major effort but they felt confident that most of the older uses could be re-established or more than replaced by new ones.

Dr. Thompson, dealing with copper, said that over 300,000 tons of the metal per annum were expected to be added to present world copper production during the next three years if present expansion programmes were carried through. Even further increases were envisaged and many trade authorities had already voiced the feeling that world copper production was heading for a situation in which copper might be in over-supply.

Works Visit

The accompanying picture was taken when a party of advanced students from the South Western Division of the National Coal Board paid a visit to the works of Scottish Cables, Ltd., Renfrew, during their 1952 tour of the Scottish coal fields. The group includes (seated left to right) Mr. T. C. Lewis (Technical College of Monmouthshire), Mr. J. Ritchie (secretary, Scottish Cables, Ltd.), Mr. J. Murdoch (area education and training officer of the Scottish Central West Area), Mr. J. S. Hastie (director and technical manager, Scottish Cables), Mr. A. B. James (Glamorgan Technical College), Mr. H. Marshall (deputy technical manager, Scottish Cables), and Mr. J. S. Henderson (Production Dept., Scottish Cables).

Coal Board students at the works of Scottish Cables, Ltd.

Lead Price Reductions

Two reductions in the price of good soft pig lead have been announced by the Ministry of Materials. On 30th April it was announced that the price would be reduced by £8 per ton to £155 per ton delivered consumers' works from 1st May, and on 2nd May, a further reduction from £155 to £147 per ton was announced to operate as from 3rd May.

Diesel-Electric Railway Equipment

British Railways have placed a contract with the English Electric Co., Ltd., for the diesel and electrical equipment for thirty-one 350 h.p. 0–6–0 type diesel-electric shunting locomotives to be built in 1953. The main frames, wheels, cab structures and mechanical parts for these locomotives will be made and assembled at the British Railways workshops at Darlington and Derby. This is the first instalment of the 573 diesel shunting engines which, as was recently announced, are authorized for construction during the five-year period 1953–57.

Tuberculosis Conference

The third Commonwealth and Empire Health and Tuberculosis Conference will be held in London from 8th to 13th July. The Duchess of Kent, president of the National Association for the Prevention of Tuberculosis, will attend. A Conference exhibition of electro-medical and

other equipment will be held at the Central Hall, Westminster, and the exhibitors will include General Radiological, Ltd., who will be showing X-ray and electro-medical equipment, and Ilford, Ltd., who will exhibit dark room and accessory equipment.

New " Arc Trap "

The Yorkshire Switchgear & Engineering Co., Ltd., states that it is introducing an arc trap which is a new development in oil circuit breaker technique. It is the result of intensive short-circuit testing and research, much of which was carried out at the KEMA Laboratories, Holland, and is claimed to function on calculable and scientific lines, operating consistently with a level characteristic of arc duration at any fault capacity up to full rating. Arcing features are entirely independent of load-carrying contacts and a complete renewal of arc traps can be carried out in ten minutes.

Although at present application is limited to the company's IVIO metalclad gear of 250 MVA rating and above, the ultimate possibilities of the arc trap are considered by its originators to be almost unlimited.

Wallsall Conduits' New Premises

On 26th April, Walsall Conduits, Ltd., opened new premises in Princess Street, Sheffield, which now supersede those occupied in Pinfold Street. The new single-storey depot is finished in attractive rustic brickwork and covers an area of over 3,000 sq ft. Mrs. A. E. Millard, wife of the managing director, opened the oak doors with a silver key and over seventy business friends and representatives of local firms were then shown round.

Waste Paper Recovery

The annual report of the Waste Paper Recovery Association, Ltd., shows that the target for 1951 of one million tons of waste paper was exceeded, the final total of 1,078,138 tons being 204,000 tons better than the best year of the war, 1942.

Town Hall Rewiring

A recommendation of the Newark General Purposes Committee that the East Midlands Electricity Board should rewire the Town Hall was rejected by the Town Council last week. Instead, it was decided to invite tenders. The proposal was described by Councillor T. P. Beeston as " grossly unfair to the traders of this town."

Drill Chart

The Sheffield Twist Drill & Steel Co., Ltd., has produced, printed in four colours on aluminium, a wall chart for use in workshops, giving British Standard twist drill nomenclature, tapping and clearance drill sizes, speeds and feeds, instructions regarding re-sharpening of twist drills, usage of twist drills, lubricants, etc. The chart is 30in wide by 20in deep. Copies of the chart can be obtained on application to the company at Summerfield Street, Sheffield, or Terminal House, Lower Belgrave Street, London, S.W.1.

Welsh Television

The B.B.C. announced last week that it is hoped to open the new television transmitting station at Wenvoe, near Cardiff, on medium power on 15th August.

Batti-Wallahs' Society

Last week's luncheon of the Batti-Wallahs' Society was preceded by the induction of Mr. J. W. Perkins as president, Sir John Hacking, the immediate past-president, investing him with the chain of office. The first duty of the new president was to present to Sir John a past-president's badge. The principal guest at the luncheon was to have been Vice-Admiral Sir Alexander Madden, but owing to indisposition he was unable to attend. Rear-Admiral D. M. Lees, Deputy Chief of Naval Personnel, deputized for him, and in an address on the personnel of the Navy he showed an understanding and a strong regard for the men who serve under him. His amusing talk illustrated the resourcefulness of the rank and file and he paid tribute to the manner in which new entries to the Navy quickly adapted themselves to Naval traditions.

Miniature Electric Motors

Victory Industries (Surrey), Ltd., manufacturers of miniature electric motors, are now making scale-model cars, in conjunction with the Nuffield organization and Vauxhall Motors, Ltd. The motive power is provided by the " Mighty Midget " electric motor (*Electrical Review*, 23rd September, 1949). Apart from their application to toys and models these electric motors are also supplied to various Government Departments, scientific instrument makers and the electrical and radio trades. The standard motor is for use on 3–6 V but any voltage between 1½ and 24 V can be catered for. It has also been decided to produce a " Micro Motor " of a more robust design suitable for use in industry.

Radio Beacons for Lighthouses

Trinity House has ordered 20 W duplicate radio beacons for lighthouses and light vessels at over forty positions on and around the coasts of Great Britain, Northern Ireland, and Eire, from Marconi's Wireless Telegraph Co., Ltd. The equipment will comply with regulations laid down at the Conference for the Reorganization of Maritime Radio Beacons in the European Area held in Paris in April, 1951. The apparatus will be duplicated, with change-over switching, indicating, and alarm facilities, to prevent any

stoppage of the service, and it will incorporate very high precision control arrangements to enable the stations to work to a rigid time schedule. At specially selected stations in the vicinity of the main ports, a dual-purpose service will be available which, in addition to the navigational aid service, will provide "request" transmissions for vessels to calibrate their direction finding instruments.

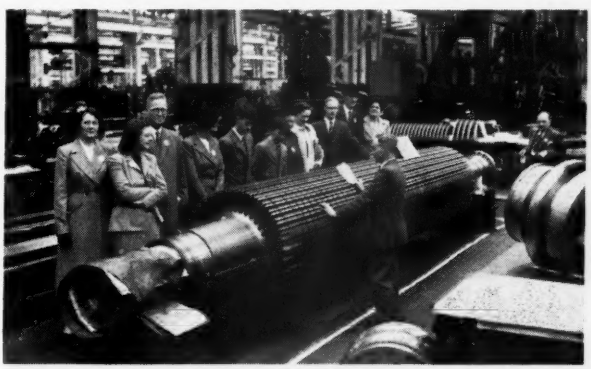
Bank Lighting in Malaya

The General Electric Co., Ltd., has recently completed four new bank lighting installations in Malaya. Twin-light fluorescent fittings with recessed "Perspex" bends have been adopted in the Hong Kong and Shanghai Bank's Singapore branch, no fewer than 146 fittings being employed in the main banking hall and a further 133 fittings in the offices on the floor above. At the Orchard Road and Penang branches h.v. cold cathode lighting is used in the main banking halls. The Chartered Bank of India, Australia and China has recently added a new wing to its Singapore premises and renovated the existing accommodation. This new lighting installation also employs G.E.C. twin-light fluorescent fittings.

B.T.H. Parents' Day

Over 200 parents of first year apprentices at the Rugby Works of the British Thomson-Houston Co., Ltd., availed themselves of the opportunity provided by "Parents' Day" on 26th April to see something of where their sons work, study, and play. In the morning the Rugby College of Technology and Arts was open to parents while in the afternoon there were conducted tours of the B.T.H. Works, and of an exhibition of apparatus made in whole or in part by apprentices. This was followed by a visit to the apprentice residence, Coton House, where tea was provided in the recreation rooms, or on the lawns, before adjournment to the dining hall for an address of welcome. The proceedings concluded with a display of fire-fighting by the Coton House Fire Brigade (resident apprentices). This was witnessed by some six hundred parents, apprentices, and guests, among whom was Councillor L. B. Fox, Mayor of Rugby, himself a member of the B.T.H. organization.

The address of welcome was given by Mr. H. L. Satchell, director and manager, B.T.H. Rugby Works, who presided and said that this year they celebrated the fiftieth anniversary of the commencement of manufacture at the Rugby Works. For the greater part of this period their apprenticeship schemes had operated with very little fundamental change. Following addresses by the Mayor and Mr. W. Cooper, Principal, Rugby College of Technology and Art, Mr. L. J. Davies, director of research and education, B.T.H., said that in the Rugby Works they numbered about 10,000 people. Altogether there were about 24,000 in factories in about twelve different towns in this country.



Parents inspecting the unwound electric rotor for a 60 MW turbo-alternator at the B.T.H. Rugby Works

Poles for Overhead Lines

In reply to a question by Mr. Vane in the House of Commons last week the Assistant Postmaster General, Mr. Gammans, said that agreements were made last year with the British Electricity Authority and the Area Electricity Boards for the joint use of poles by these authorities and the Post Office where it was technically possible to do so. The practice had been going on for some time informally, and was being encouraged as much as possible.

Chelsea Flower Show

At the Chelsea Flower Show, which will be held in London from 20th to 23rd May, the theme of the E.D.A. stand will be, "Electric heat in your garden," the emphasis being on plant irradiation with ultra-violet lamps. Displayed on the stand will be examples of electrical appliances for horticultural work, together with a number of models showing heating applications. There will be an "Alpha" electric soil sterilizer and G.E.C. soil sterilizers, and a greenhouse heater with humidity control. Among the models will be an electrically-warmed propagating bench laid with soil-warming wires to provide bottom heat, a model of a frame laid with soil-warming wires to form a propagating bed for raising half-hardy plants; a model showing how a soil-warmed hot-bed frame can be used for tomato growing after an early crop of lettuces has been picked; and a

model showing a run of cloches with soil-warming wires laid. Also on the stand will be examples of ultra-violet lamps, transformers, thermostats and other accessories for the garden and greenhouse.

Brook Motors Sales Conference

Brook Motors, Ltd., held their 1952 sales conference in Huddersfield on 28th April. It was attended by branch managers from the company's sixteen branch offices in all parts of Great Britain. The day's proceedings were concluded by a dinner for directors, executives and visiting managers at the George Hotel, Huddersfield.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £148 0s 0d
COPPER, H.C. Electro	ton £231 0s 0d
Fire Refined 99·70 per cent ..	ton £228 10s 0d
Fire Refined 99·50 per cent ..	ton £228 0s 0d
COPPER Tubes	lb 2s 2½d
Sheet	ton £285 0s 0d
H.C. wire and strip	ton £258 10s 0d
LEAD, English	ton £148 10s 0d
Foreign	ton £147 0s 0d
MERCURY	flask £73 10s 0d
TIN	ton £964 0s 0d
ZINC, G.O.B. Foreign	ton £190 0s 0d
Electrolytic	ton £194 0s 0d
BRASS Tubes	lb 2s 1½d
Sheet	lb 2s 5½d
Wire	lb 2s 8½d
PHOSPHOR BRONZE	
Wire	lb 3s 8½d
RUBBER, No. 1 R.S.S. spot ..	lb 29½d–30½d

Thames Weir Operation

It is reported in the *Berkshire Chronicle* that contracts have been placed for modernizing Caversham Weir on the River Thames at a cost of £22,000, but it is added that owing to the shortage of steel there may be delay in carrying out the project. Provision is made for electrical operation of eight large sluice gates.

Catalogues and Lists

Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.—Illustrated leaflet announcing the re-introduction of the Lundberg " Marvel " switch.

Beeantee Illuminations (London), Ltd., 69, Upper Street, Islington, London, N.1.—Illustrated coloured folder on theatre and cinema lighting fittings.

Visco Engineering Co., Ltd., Stafford Road, Croydon, Surrey.—Publication No. 514 describing steel shell water cooling units.

De Renzi, Holmes & Co., Ltd., Fox's Lane, Wolverhampton.—Two illustrated leaflets describing new additions to their range of cam-operated contactor controllers and crane protective panels.

Johnson, Matthey & Co., Ltd., 73-83, Hatton Garden, London, E.C.1.—Illustrated data sheets on silvered mica capacitor plates (2461) and precision silvered mica capacitors (2464).

Falk, Stadelmann & Co., Ltd., 91, Farringdon Road, London, E.C.1.—100-page catalogue of outdoor, industrial and display lighting fittings. (792/52).

Birlec, Ltd., Tyburn Road, Erdington, Birmingham, 24.—Illustrated brochure dealing with gas and electric furnaces. (Publication No. 39).

Cuthbert Andrews, 5, High Street, Bushey Village, Herts.—1952 edition of a catalogue of " Everything X-Ray, " illustrated and indexed (price 3s 6d).

Northern Aluminium Co., Ltd., Banbury, Oxfordshire.—A new edition of " Specifications for Aluminium and Aluminium Alloy Products."

Trade Announcements

Mr. J. G. Eminton, formerly of the London head office of **Keith Blackman, Ltd.**, has been transferred to Bristol. Initially, he will cover an area west of a line Banbury, Witney, Salisbury, Poole and Swanage; inquiries from this area should be addressed to him at 13, West Dene, Westbury-on-Trym, Bristol, Glos (telephone : Stoke Bishop 32519).

Mr. J. W. Fielder has resigned his active appointment with **Wisehill, Field & Co., Ltd.**, Andover, Hants, and for the time being Mr. J. A. Hill is carrying on the company pending reorganization.

S. N. Blagbrough (Bingley), Ltd., have opened a plant at Victoria Works, Bingley, Yorks, for the processing of yarns and braiding for cable wrapping, under the supervision of Mr. S. N. Blagbrough.

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

" GB " all-steel lug-grip junction boxes.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

New Warships

Large Destroyers and an Aircraft Carrier

THERE has recently been accepted into the service of the Royal Navy the first of the "Daring" class of destroyers. She and her seven sister ships, all in various stages of construction, are the largest destroyers ever ordered by the Admiralty and are suited to carry out the functions normally assigned to small cruisers.

H.M.S. *Daring* is of 390ft extreme length, 43ft beam and 12ft 6in draught; the size is necessitated by the increased technical equipment carried. The electrical installation is d.c. at 220 V; the galleys are equipped with electric cooking apparatus, and there are a modern laundry and many labour saving devices for cleaning ship.

Of all-welded construction, the *Daring* was built by Swan Hunter & Wigham Richardson, Ltd., and is propelled by geared steam turbines manufactured by the Wallsend Slipway & Engineering Co., Ltd. The shore trials were undertaken by Pametrada, during which 525 separate quantities had to be measured. To assess the distribution of torque between each pair of quill shafts and convey an idea of power sharing by the turbines, strain gauges were fixed to the quill shafts and connected through sliprings to a specially developed indicating instrument while capacitance gauges indicated turbine rotor and gear movements. Apart from thermometers, 112 thermocouples associated with five multi-point automatic recorders measured temperatures: for instance in the condenser tubes, inner and outer h.p. and l.p. turbine casings, while rotating thermocouple assemblies were inserted in the rotor bores with leads taken out through sliprings; brushes were fitted to pick up potentials built up on the rotors electrostatically or otherwise.

Comprehensive Electrical Equipment

Final acceptance after sea trials is also announced of H.M.S. *Eagle*, an aircraft carrier of 803ft 9in length and 36ft draught. Harland & Wolff, Ltd., Belfast, were responsible both for the hull and main machinery. This fleet carrier's two hangars are served by high-speed lifts; there are two launching catapults and flight deck lighting will enable jet aircraft to operate by night as well as by day.

Some 400 miles of electrical cable of all sizes was installed, needing half a million connections. The total connected load is nearly 11,500 kW, but the considerable diversity in use enables the peak load to be carried by generating plant of 4,000 kW. There are eight generators, each of 500 kW; four are steam driven and four diesel driven. Each is capable of sustaining a 10 per cent overload for two hours.

A 220 V water-tight ring main system is used for distribution, tapped off round the ship through 300 breakers. An emergency supply system is fitted for use in the event of damage. Distribution of electricity is controlled from a central large switchboard and four smaller switchboards for use in emergency. From each the supplies to a quarter of the ship can be controlled. All switchboards are provided with an elaborate system of indication lights.

There are over 1,000 motors in the ship, representing a total connected load of over 8,000 kW. They range in size from 200 h.p. motors for aircraft lifts down to fractional h.p. motors for a variety of services.

There are 500 lines to the automatic telephone exchange. For vital action communications there are telephone groups which are independent of electrical supplies. An integrated main broadcast system is fitted: when in action various departments of the ship can take control of appropriate units (e.g. the armament broadcast unit by gunnery personnel) so that only warning signals from the main system can override transmissions on the unit system; 600 loudspeakers are installed.

Food Preparation Machinery

Electric galleys are fitted throughout and electrical machinery is used for pie making, dough kneading, potato peeling and dish-washing. All the canteens are similarly well provided with ice cream mixing and storage plant as well as soda fountains. Cold water for drinking is provided from electrically driven units scattered through the ship. Electrical laundry facilities are available.

Approximately 10,000 lighting points are installed, 3,000 of which are fitted with twin-lamp fluorescent fittings. The standard of illumination conforms generally with the best practice on shore; complete absence of glare is a feature of the fluorescent installation. In the event of severe damage to the ship putting the normal lighting out of action, a complete system of battery operated emergency lanterns (relay-operated miners' type) will be switched on automatically. A system of "red" lighting allows for rapid adaptation of vision at night.

Some 450 electrically driven ventilation fans circulate fresh air throughout the ship and in important action positions and in mess spaces there are air conditioning installations.

Industrial Dust

Available Means of Abatement

CONTROL of the emission of industrial fume and dust and means of recovering the latter is the subject of a paper by Mr. R. Ashman (Power-Gas Corporation, Ltd.) presented at a general meeting of the Institution of Mechanical Engineers in London last week.

The paper resulted from the author's effort systematically to correlate data and information on the subject, a rather controversial one, in order to give the non-specialist engineer an unbiased working knowledge of the methods employed. Following a brief explanation of the nature of fume and dust the paper turns to methods of control which are classified as gravitational, inertial and centrifugal separation, electrostatic precipitation, filtration, washing and ultrasonic agglomeration, each of which is briefly described with the aid of diagrammatic representations of the plant.

Electrostatic Precipitation

The capital cost of electrostatic precipitation equipment is said generally to be considerably greater than that of alternative equipment, but for duties for which it is applicable very high efficiencies can be obtained. The greater the recovery efficiency needed the lower will be the velocity of the gases through the electrostatic field and consequently the larger the installation for any specific duty. The power cost is low and gases at temperatures as high as 1,000 deg F have been successfully treated, although certain gases require to be conditioned, usually by the addition of water, before they can be ionized. Probably more than with any other type of equipment electrostatic precipitation plant demands most careful consideration of any problem for which it has not previously proved itself suitable.

The ultrasonic agglomeration method of recovery is still in its early stages of development on a commercial scale although a few commercial installations have, in fact, been built. A recovery efficiency of 90 per cent has been claimed in several cases in which dust concentration exceeds 1 grain/cu ft, but the opinion has been expressed that the noise made in operation may be troublesome.

The paper concludes with some references to the explosion and fire hazards associated with industrial dusts, in which connection a considerable amount of research work has been carried out by the Factory Department and the Safety in Mines Research Board. In Great Britain factory inspectors of the Ministry of Labour and the chief inspector under the Alkali, etc., Works Regulation Act, set the standard of permissible contamination for most dust recovery installations. A "Guide to the Recovery of Efficient Dust and Fume Control and Recovery Equipment" which is to be published by the British Standards Institution should, in the author's opinion, ultimately establish some measure of standardization and consequently improve efficiency in this expanding branch of industry.

Another paper read at the same meeting by Dr. H. Heywood (Imperial College of Science and Technology, London) deals with filter efficiency and the standardization of test dust. From research conducted in the Imperial College laboratories the author considers that the use of a test dust compounded to a rigid specification is essential for comparing the performances of air cleaners for engines and he suggests that the same principle might well be extended to the testing of filters for other purposes.

New Instrument Journal

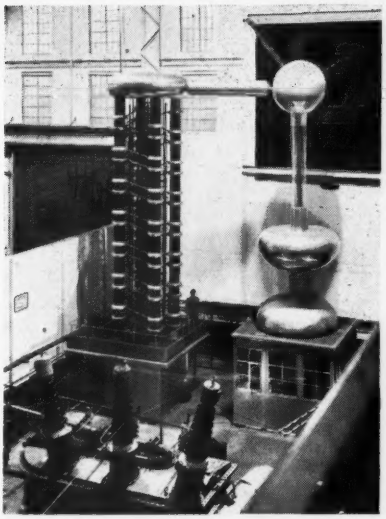
THE first issue of a new scientific journal, *Instrument Engineer*, has just been published by George Kent, Ltd., Luton, Beds. This publication, which is intended for users of industrial instruments, will appear twice yearly, price 2s 6d per copy. The articles in the first issue deal with oxygen analysis, special purpose applications of "on-off" control, the application of automatic control to a gas producer and the history of flow measurement by differential pressure. There is also a section of book reviews and a bibliography of references to articles of interest to instrument engineers.

B.T.H. Research

Review of Activities in 1951

A WIDE diversity of investigations into electrical and allied problems were carried out in the B.T.H. Research Laboratories during 1951. The Physical Analysis Group expanded considerably while on the materials side, new techniques for determining crystal orientation in magnetic sheet steel having been established, attention was focused on the effect of different final annealing atmospheres on the properties of samples of cold reduced silicon-iron as obtained from various sources. Results so far indicate that although the final annealing temperature (whether pure dry hydrogen or nitrogen, or mixtures of the two) does not necessarily affect markedly the total watts loss in material as received; some annealing atmospheres may increase the "ageing" of the material, i.e., the increase in losses during life.

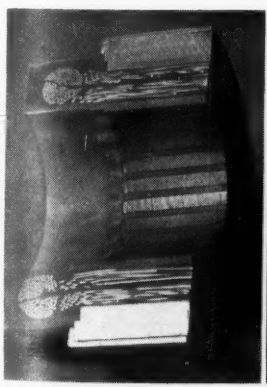
Another problem was devising a sodium resistant glass of linear thermal expansion coefficient about 5×10^{-6}. Other unusual glasses receiving attention were the tellurite group, the main features of interest being the values for the refractive index, the infra-red transmissions and dielectric properties.



The 2 MV impulse generator erected in the heavy plant factory of the B.T.H. Co. at Rugby

Work on insulations continued and a number of polyster resins (liquids which can be completely converted by heat or by the addition of accelerators to infusible solids) were prepared which can serve as solventless varnishes or casting resins. A new laminating resin has also been developed which makes possible the manufacture of paper tubes of outstanding resistance to water. Another development was a core plate enamel for use on the laminations of hydrogen-cooled generators which, apart from good chemical resistance, stands up well to high temperatures. In the same department mica splittings were reduced to flakes about 1 sq mm in area and 10^{-5} cm thick by ultrasonic vibrations. In water, this exfoliated mica can be formed into a sheet material without the addition of a binder.

A great deal was done in the field of apparatus, instrument, and process research. Work on lead sulphide photocells resulted in the development of a radiation

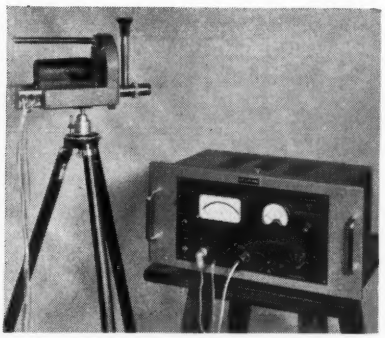


Section of motor stator showing complete impregnation of windings with polyster resin

New p-n junction type germanium rectifier

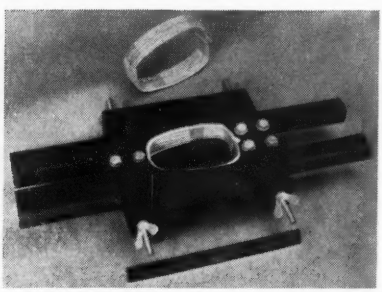
pyrometer capable of measuring surface temperatures down to 150 deg C, while experiments in conjunction with life tests on cells at high currents showed that lead sulphide photocells can directly control powers considerably above the capacity of other types. They can open and close the contacts of a relay in response to irradiation without the interposition of a valve amplifier, and as the system can work directly from a.c. mains a transformer is not required.

During the year work in America led to the production of semi-conducting crystals with internal barriers or junctions which provide an area of effective action rather than a point and make it possible to dispense with the delicate surface contact and catswhisker. Three types of germanium rectifiers employing these new p-n junctions were produced experimentally.



Radiation pyrometer using lead sulphide photo cell

Model coil showing cross section of new betatron toroid



A betatron toroid was made with a cross section of 3·5in by 2·5in and which fills "all the corners." Other interesting work was concerned with T.B. and T.R. valves for marine radar, an ophthalmic magnet of special magnetic force/weight ratio, a single strip iron loss tester and a recurrent surge oscillograph.

The erection of the 2 MV impulse generator in the heavy plant factory at Rugby was completed and the generator successfully operated. Specially designed aluminium electrodes, probably the first of their type anywhere, were erected which together form a standard capacitance for use with impulse voltages up to 2 MV. The upper "bun" of the field gap is supported beneath a terminating sphere from a tripod of insulation members mounted on the wall. There is provision for connecting the generator to this sphere, and between the sphere and the upper electrode there is a non-inductive resistor of about 200 ohms, capable of withstanding a 2 MV impulse. This resistor presented considerable design difficulties but most of the problems were solved by making it in the form of 20 glass tubes filled with electrolyte.

A coil pair was designed in the laboratory and has since been supplied to Harwell for use in producing a field of 10,000 gauss within a cloud chamber. The field is recurrently pulse excited and about 60 kW mean is dissipated as heat in the water-cooled coils. The design represents a balance between the demands of electrical insulation, thermal conductivity and magnetic forces. The two halves of the coil have to withstand attractive forces of 60 tons when they are pulsed.

I.E.E. Annual Meeting

THE annual report of the Council of the Institution of Electrical Engineers for the 1951–52 session together with the statement of financial accounts for the year ended 31st December last are to be presented at the annual general business meeting to be held on Thursday, 15th May, at 5.30 p.m. Copies of both these printed documents are obtainable by members in advance by application to the secretary.

The business meeting will be followed at 6.30 p.m. by a special general meeting of corporate members only for the purpose of considering and, if thought fit, approving alterations to the I.E.E. by-laws with such amendments as the Council may approve.

Canadian Standards

Functions of the C.S.A. and its Procedure

BEFORE any imported electrical equipment may be offered for sale, or connected to the public electricity supply mains, in Canada it must be certified as being admissible by the Approvals Division of the Canadian Standards Association. The increasing annual volume of British-made electrical equipment exported to that country caused arrangements to be made upon the return of a British Mission for some of the work involved in securing such approval to be done in the United Kingdom. (See *Electrical Review*, 16th December, 1949, and 7th September, 1951.)

Mr. F. R. Whatmough, chief engineer, Approvals Division, Canadian Standards Association

To offer British manufacturers exporting engineering equipment to Canada an opportunity of appreciating the procedure involved a meeting was arranged in London last week which was addressed by Mr. F. R. Whatmough, chief engineer of the Canadian Standards Association's approvals laboratories. Mr. Whatmough explained that during the past 32 months the British Standards Institution has provided six engineers with a secretarial staff to deal with C.S.A. approval work in constant collaboration with the laboratory staff in Canada. The former examine and test British-made equipment against the latter's standards and practice. This work has so far been mainly concerned with motors, transformers, industrial control gear, machine tools and switchgear, but some domestic electrical appliances and apparatus for light commercial applications have also been dealt with.

The address outlined the origin, purpose, scope and manner of operation of the C.S.A. approvals laboratories. Their main purpose is to reduce to an acceptable degree the "fire risk and life hazard incident to the operation of" electrical equipment. The examination and testing of prototypes is undertaken because Provincial Governments, not the Dominion Government, are concerned with the safety in operation by the public both of domestic and industrial electrical equipment. The C.S.A. is the recognized instrument of the Provincial electrical inspectors whose operations are based on Provincial electrical codes which are, in turn, almost wholly based on the Canadian Electrical Code published by the C.S.A.

Part 1 of the Code includes all kinds of electrical equipment, excepting certain kinds used for communications, railway, tramway, aircraft and marine work. Numerous standards, known as the specifications of Part 2 of the Code, deal with the safe construction of electrical equipment. About three-quarters of 107 such specifications have been completed; the remainder have been started and are in various stages of completion. It is estimated that 200 specifications will be needed, subject to constant revision and co-ordination. Parts 1 and 2 of the Code are compiled by two committees which differ somewhat in composition. The B.S.I. is represented on Part 1 committee and will presently also be represented on Part 2 committee, to give British manufacturers representation.

These Standards are safety standards and are not to be confused with electrical engineering standards of the usual type. Much of the equipment examined and tested is not covered completely by any standard; consequently the C.S.A. laboratories use with discretion information from various other sources, including the B.S.I.

The laboratories in Canada, which have

a staff of 150 people, are organized into three groups: administration, engineering and inspection. In prototype testing a formal application is lodged by the submitter, a fairly high fee is deposited, with representative samples, or an arrangement is made to visit the manufacturer's plant, and a project is assigned to an engineering specialist who examines and tests the specimen, advising the submitter of any alterations desired.

To expedite the sale of equipment the laboratories may grant interim approval. The final report goes to an Approvals Council for formal acceptance after which an agreement is executed for annual factory inspection to maintain approval on a yearly basis. Since the war an average of 1,700 applications have been received yearly. Over 11,700 approval numbers are in use, a few of which cover hundreds of separate submissions over a period extending back 30 years. There are over 35,000 files of approval. Last year there were over 4,500 re-inspections of listed equipment at manufacturers' works.

The " manifest of approval " is in the form of a number, label, or monogram. Last year 15 million labels were issued. Re-inspections are made once or more frequently a year at manufacturers' works in the United States, Canada, Great Britain and Europe. Mr. Whatmough made it quite clear that " approvals engineering " does not merely consist of a certification programme based on visual inspection. On the contrary, in addition to the examination and testing of the product, an appraisal is made of the manufacturer's ability consistently to make the product to the satisfaction of the C.S.A., which is conscious of its main function to ensure the safety of the public in respect of the use of electrical appliances.

Safety in Electrical Industry

Methods of Treating Shock

THE Electrical Branch of the Factory Department (Ministry of Labour and National Service), together with the Burton Manor Residential College for Adults, Burton-in-Wirral, Cheshire, organized last week a course in electrical safety for electrical engineers, which was attended by senior engineers of some of the largest organizations in the country.

The course dealt with many aspects of electrical safety: papers were read on Monday on " The Provision of Direct Current for Electrolytic Work " by Mr. Ehrensperger (Brown-Boveri, Baden, Switzerland); on " Electrical Accidents " by Mr. E. Sutton (H.M. Electrical Inspector of Factories); on " Electronics " by Professor E. Williams (Bangor University); and on " Earthing " by Mr. Noel Elliott (H.M. Electrical Inspector of Factories).

On Tuesday a special study was made of " The Effects of Electricity on Human Beings " and methods of treating these effects. In addition to the electrical engineers a considerable number of medical men also attended, together with world authorities on the subject of electric shock.

The proceedings were opened by Professor Jellinek, lecturer in electro-pathology in Vienna, who read a paper. He demonstrated by pictures and from actual experience that an electrical injury is something quite unique, and he showed examples of people who had suffered from severe electrical burns, sometimes destroying large areas of skin, flesh and even muscle, exposing the bones, where complete recovery had followed when, by normal standards, it would have been necessary to amputate parts affected or to have carried out extensive skin grafting operations. In these peculiar electrical injuries not only did healing take place, but the nature of the tissue which re-grew was identical with the original tissue. Full muscular control was restored and the skin, which grew again, sometimes over large areas of damaged bone, had its normal elastic properties and not the usual scar which covers the wound.

Professor Jellinek impressed on those present that the important feature of

At the Burton Manor course: Dr. Francois (chief medical officer, Electricité de France), Dr. Frohlicher (Zurich), Professor Dalziel (Berkeley, California), Professor Djourno (Paris), Dr. E. S. Eve (U.S.A.), Dr. A. M. Brown (warden of the College), Mr. Donald A. Ficken (director of the course), and Professor S. Jellinek (Vienna)

electrical burns was that a conservative treatment could be followed and in most cases should be continued. He said that of the 5,000 or more cases which he had treated, it had been necessary to amputate only in two cases. In one of these the patient had suffered an electric shock and appeared perfectly well for a few days after the accident, but suddenly collapsed with evident signs of septicæmia. In this case amputation of the affected arm brought an almost immediate recovery, and the man who, before the operation, had been lying unconscious recovered sufficiently to ask for a glass of beer within an hour or so of the operation.

Dr. Frohlicher, of Zurich, also dealt with the necessity of amputation in certain cases of high-voltage shock. He also discussed the question of treatment of fibrillation, and outlined a method which he, together with Professor Fischer of Zurich, had developed by which the injection of acetyl cholin into the heart controlled fibrillation and made possible the restoration of normal circulation. These experiments were originally carried out on isolated hearts, but Dr. Frohlicher mentioned that this treatment had been successfully applied to a human being in Switzerland. He said that they were still working on this problem because they did not feel that, as yet, they had the ideal method.

Dr. Frohlicher also outlined his work on the treatment of those who had received a high-voltage shock. He recommended that as soon as they were conscious they should be given as much to drink as possible to irrigate the kidneys, and that the drinks should, as far as possible, be alkaline. He recommended a teaspoonful of sodium bicarbonate in a tumbler of water to which sodium citrate had been added to make it more palatable. These chemicals had the effect of encouraging the alkali form of myoglobin, rather than the acid form, and the alkali form was very much more easy to eliminate. Failure to eliminate these myoglobins which resulted from the decomposition of the blood in damaged tissue might result in blocking of the kidneys which, in turn, would result in uræmic poisoning.

The speaker outlined the results of his experiments in artificial respiration. He said that while he felt that the Eve method was pathologically the best method because of the necessity for some apparatus, he recommended the Sylvester method for immediate first aid. He demonstrated this method and pointed out that to carry it out successfully was hard work, but it did produce considerable ventilation of the lungs, even in the worst cases of collapse and this, he said, was not always true of the Schafer method.

Professor Dalziel, of Berkeley, California, outlined his work in determining the minimum currents which could be sensed by human beings; the maximum current at which they were able to let go, and the effects of capacity discharges and other steep fronted currents. He said that, in general, he recommended that the leakage current to the frames of apparatus should not exceed 0·3 milliampere, and therefore that radio suppressor devices and similar apparatus should be so designed that while they were connected to the frame of the apparatus the current should be limited to this value, otherwise people would receive an unpleasant, though not dangerous, shock. He said that his researches showed that the "let go" current, that is, the current which a person could pass without completely inhibiting muscular control, was of the order of 14 mA, and he illustrated the statistical method which he had used to obtain these figures. He mentioned that the effect of frequency was not important,

the curve of susceptibility being substantially flat between 10 c/s and some thousands of cycles.

The next paper was a contribution by Dr. I. S. Eve, son of Dr. Frank Eve, the originator of the Eve "tilting stretcher." He surveyed the methods of treatment of electric shock, mentioning the Schafer, Sylvester, and Holger-Nielson methods of artificial respiration, and the method which had been developed by his father. He referred to the work which had been done by Professor Pask in Newcastle and a team of doctors in America on the valuation of these artificial respiration methods, and said that all these seemed to confirm that the Schafer method was of very doubtful efficacy when used on an inanimate body. Whilst effective when demonstrated on the live body where the muscular system retained its tone, it had been demonstrated that where this muscular system was rendered passive by injections, for example, of curare, the Schafer method of artificial respiration did not achieve sufficient ventilation of the lungs to maintain life, and in all experiments it had been necessary to stop the experiment and use one of the other means of artificial respiration to maintain life. His father's method, in addition to ventilating the lungs, did promote some measure of blood circulation, which was essential if life was to be maintained in a body whose lungs and heart had been temporarily paralysed by the passage of an electric current.

Professor Djourno, of Paris, outlined the work which he had done on counter-shock treatment to control fibrillation, and he advocated the method by which the current was applied directly to the heart by means of a hollow needle. He said that this could be done easily, and the needle served a number of useful purposes. If the heart was beating normally, this could be sensed through the needle, and there was no need to pay attention to the heart. Efforts could be concentrated on normal artificial respiration, but if the heart was found to be stationary then the hollow needle could be used to inject stimulants into the heart muscle, and fibrillation could be detected by movement of the needle, and the needle itself could be used to pass current into the heart which would stop the fibrillation and restore the heart to a state in which artificial respiration could be resumed.

Professor Djourno described the circus movement theory of the initiation of fibrillation. A very interesting discussion, chiefly carried out by the medical visitors to the course, followed.

On Wednesday Mr. Fordham-Cooper (H.M. Electrical Inspector) read a paper on "Dangerous Machinery," and Mr. T. P. Threlkeld (H.M. Superintending Inspector of Factories) read a paper on "The Legal Requirements for Electrical Safety." In the afternoon a paper was given by Mr. Simmonds of the English Electric Co., on "High Rupturing Capacity Fuses," and on Thursday there was one by Professor Meek of Liverpool University on "Electrostatic Effects."

Mr. D. A. Picken (H.M. Electrical Inspector of Factories), the director of the course, read a paper on "Minimizing the Dangers of Electric Shock resulting from Welding by Voltage Reduction," and outlined a number of methods by which the normal open circuit voltage of the welding apparatus could be reduced. Mr. Leighton, another of H.M. Electrical Inspectors, read a paper on "Circuit Protection," and the course closed with a discussion on outstanding problems.

It is intended to organize a similar course next year from 19th to 24th April inclusive.

B.E.A. Contracts

DURING the past month the British Electricity Authority has placed contracts for equipment for power stations, transforming stations, and transmission lines, amounting in the aggregate to £2,830,692. The principal contracts include the following:—

Deptford East power station: Reinforced concrete cable tunnels.—A. Waddington & Son. East Yelland, near Barnstaple: One 30 MW turbo-generator.—C. A. Parsons & Co. Portishead "B," near Bristol: Ash and dust handling plant.—B.V.C. Industrial Constructors. Goldington, Bedford: Foundations.—Mitchell Construction Co. Drakelow, Burton-on-Trent: Control and instrument cables and accessories.—British Insulated Callender's Cables Co. Ince, near Ellesmere Port: Coal handling plant.—Simon Carves. Skelton Grange, Leeds: Ash and dust handling plant.—Babcock & Wilcox. Fleetwood power station: Pile foundations, access roads, and main foundations.—M. J. Gleeson (Contractors). Blackburn power station: High and low pressure pipework and valves.—Babcock & Wilcox. West Melton and Neepsend substations, Sheffield: 132 kV, 2,500 MVA and 3,500 MVA switchgear.—British Thomson-Houston Co.

Engineering in Europe

Survey of Current Literature

ELECTROLYTIC polishing is being used on an increasing scale in many industries and also for some scientific purposes. It is mainly a finishing process and often improves the surface of materials that are not susceptible to any other finishing method. The process is cheap, saves time, is economic in other respects and in many cases even the quality of the goods so treated is improved; it should be noted that there is no deformation of the outer layers of alloys, which tends to increase corrosion resistance.

Electropolishing raises the reflecting power of metal reflectors to the maximum and, when used on machine elements, it improves their frictional properties, thereby reducing wear. It is less certain that it has any, possibly beneficial, effect on the ageing properties of metals. An important fact is that electropolishing makes faults of the metal surface, such as cracks and inclusions, conspicuous. The method is also suitable and, indeed, the most suitable, as a preparation to electroplating processes and the like. The article outlines the process itself and includes comprehensive tables of all the electrolytes and operating conditions (current, voltage, temperature and processing time) used for every conceivable metal or alloy.—" On Electrolytic Polishing," E. Gebhardt and G. Winkhardt, *Elektrotechniker*, Vol. 4, No. 1, pp. 1–8, January, 1952, in German.

Transformer Ageing under Test

The short-circuit testing of a transformer is mainly carried out to subject the transformer to the severest mechanical stresses to which it may be exposed under service conditions; it also supplies data for the determination of losses. Yet it is often overlooked that it also sets up the maximum thermal stresses and that the latter may produce irreversible effects in the insulation which amounts to an appreciable reduction of the service life of the transformer, or at least of the windings. This loss of service life may be computed by combining the law of variation of the hot-point temperature with the (exponential) ageing curve and by introducing the " equivalent ageing time " suggested by Montsinger.

The results of this calculation show not only that the internationally accepted maximum temperature of 250 deg C is certainly too high, but that the more recent limitation of the duration of the short-circuit current to 3 sec (instead of 5 sec) is also insufficient to prevent damage being done, at least if it cannot be proved that limitation of the duration results in a reduction of the maximum temperature, because the temperature rise goes on after the period of the actual short-circuit. The author suggests, therefore, a limitation of the permissible temperature to 200 deg C and the previously permitted durations of the short-circuit current to be maintained.—" Ageing of the Transformer during the Short-Circuit Test," L. Libert, *A.C.E.C.*, Charleroi, No. 4, pp. 36–41, 1951, in French.

Telemetering Power

Regulation of the power produced by one station, or a group of stations, belonging to a certain zone of an interconnected system should, first, ensure that the output of the group satisfies the variable demands of that zone and, secondly, that any excess power available may be used to satisfy the equally variable needs of other zones through the interconnected system. Furthermore, the power flux between the zones through the interconnecting lines should generally be maintained at a constant, predetermined, value and the distribution of the power transmitted on the existing parallel lines should always be the most favourable one. These partly contradicting conditions cannot be even approximately satisfied without a very elaborate and quick-acting telemetering and telecontrol system. The paper surveys the various telemetering systems or methods: pulse frequency, frequency variation, pulse compensation and frequency

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates.—Editors, *Electrical Review*.

compensation, pulse duration and pulse-number systems, the types of transmitting and receiving apparatus, integrating and selecting devices used and their auxiliaries. The conditions to be satisfied by any reliable and efficient telemetering system are stated and discussed in a preamble.—"Problems of Telemetering in the Operation of Interconnected Power Systems," V. Modoni, *Energia Elettrica*, Vol. 29, No. 2, pp. 73–93, February, 1952, in Italian.

Skin Marking after Shock

Despite the considerable amount of research work done on the various aspects and forms of electrical accident it is rather surprising that scant, if any, attention has hitherto been paid to the nature of its most striking symptoms, the so-called current marks. In the case of lightning strokes they take the form of dendritic erythemas on the skin which subside within about two days and were long ago correctly recognized as effects of spark discharges spreading over considerable areas of the skin surface (Lichtenberg, 1777). However, the quite unfounded opinion that they were superficial "burns" persisted although, were this true, cells, at least of the epidermis, must have been destroyed, which obviously could not be replaced as quickly as two days.

Histological investigation shows clearly that there is no destruction whatsoever (always referring to these current-marks only, not to actual *burns* produced in many, especially fatal, accidents) but a spontaneous, yet reversible, anatomical change of the cell condition. It is particularly interesting that what criminologists call the "dactyloscopic relief" is completely smoothed out in the mark while the mark itself is mostly a geometrically regular (circular or annular) discoloured (either whitish, black, or grey-yellow) spot.

Under the positive pole the tissue is distinctly densified, under the negative it is loosened up. These marks are a characteristic example of purely electrical cell transformations such as occur in many parts of the human body under the passage of current and, unfortunately, may not be reversible if they affect the most vital organs. The contribution of the author, who was the founder of the science of electropathology, deserves attention as adding another important detail to a subject with which every electrical engineer must become conversant.—"The Electric Accident as Effect of the Impact of the Electric Current on Living Matter," S. Jellinek, *E. und M.*, Vol. 69, No. 5, pp. 121–123, 1st March, 1952, in German.

Contact Chatter

The investigation of electric contact arrangements for high switching speeds is facilitated by substituting mechanical equivalent systems for the actual contact mechanisms. The contact masses are regarded as rigid and as located at the centres of gravity. The elasticity of the contact is simulated by a helical spring connected to the mass. The elasticity of the suspension may generally be neglected. The duration of the first collision between contacts depends only on their masses and elasticities and is independent of the relative velocities at the moment of impact. The period of contact is longest if the mass of the contact hit is large compared with the hitting contact. A rigid stationary contact is better than a sprung one because it permits the pressure to be increased to a higher value during the first contact phase.

Chatter (rebounding) does not occur when the speed of the switching movement is so small that the kinetic energy of the moving contact may be eliminated by friction, but it may also be prevented by the effect of additional forces increasing the contact pressure during the collision to a value making successive rebounding impossible. These forces may be either mechanical or magnetic. Obviously much depends on the contact material, whose electrical and mechanical characteristics must satisfy rigorous conditions. Hardness and high fusing point are as important as good electrical and thermal conductivities.—"Chatter of Electric Contacts," K. Brehm, *A.E.G.-Mitteilungen*, Vol. 41, No. 11/12, pp. 302–309, November/December, 1951, in German.

Modern Electrical Contracting

This recently-published book by H. R. Taunton, A.M.I.E.E., explains thoroughly and lucidly the methods of organizing and running an electrical contracting business. It forms an invaluable guide to those proposing to start or already engaged in electrical contracting. It is obtainable from all booksellers or the Publishing Dept., Dorset House, Stamford Street, London, S.E.1, price 10s 6d (postage 5d).

ELECTRICITY SUPPLY

Power Station Efficiencies

Reducing Dam Construction Costs

The average thermal efficiency of the steam power stations of the British Electricity Authority (based on kWh sent out) for the calendar year 1951 was 21·79 per cent compared with 21·53 per cent for 1950. The difference, 0·26 per cent, represents a coal saving of 400,000 tons valued at over £1,000,000. In the three years up to and including 1951, about 2 million tons have been saved, despite deterioration in the quality of the coal.

The 20 steam stations of the Authority with the highest overall thermal efficiencies for 1951 are:

Station	Thermal Efficiency per cent
Dunston "B" 2, Newcastle-upon-Tyne	29·39
Battersea "B," London	28·62
Stourport "B," Worcs	28·38
Littlebrook "B," Dartford, Kent.	28·32
Poole, Dorset	27·79
Agecroft H.P., Salford	26·98
Cliff Quay, Ipswich	26·86
Fulham, London	26·83
Primsdown "B" H.P., near Enfield	26·78
Hams Hall "B," near Birmingham	26·44
Staythorpe, Newark	26·42
Llynfi, Bridgend	26·38
Stuart Street H.P., Manchester	26·33
Meaford, near Stoke-on-Trent	25·91
Kearsley H.P., Lancs	25·78
Dunston "B" 1, Newcastle-upon-Tyne	25·72
Battersea "A," London	25·71
Barking "B," London	25·66
Earley, Reading	25·55
Little Barford, near St. Neots, Hunts	25·48

Dunston "B" No. 2 section which heads the list with an efficiency of 29·39 per cent illustrates the economy of new plant, since No. 1 section came sixteenth in the list. Nine new power stations which were started up during 1951 are not included in the list. These are Blackwall Point, London; Plymouth "B"; Rye House, Herts; Nechells "B," Birmingham; Bromborough, Birkenhead; Skelton Grange, Leeds; North Tees "C," Middlesbrough; Westwood, Wigan; and Braehead, Renfrew.

No less than 1,255 MW, nearly 10 per cent of the present total output capacity, is over 25 years old. When modern plant has been substituted, about one million tons of coal a year will be saved. Moreover, in the next five years about the same capacity will also reach that age and its replacement will produce a similar saving. An overall average thermal efficiency of 26 per cent is expected in 1960.

Service Cable Costs

A number of questions by the Ayrshire Burghs Association relating to charges for new supplies have been answered by the South West Scotland Electricity Board. The Board stated that expenditure approved during the year ended 31st March, 1951, for connecting housing schemes averaged £49 per house. The present-day cost of laying underground service cable was approximately 25s/yd. In the case of private houses the charge was similar to that made for Council houses. For a farm of 100 acres the Board would require a lump sum payment of £100 and a guarantee that the farmer would pay for energy to the value of £40 a year for five years. In many instances commercial and industrial consumers were asked to pay the whole cost of connection. Where only a proportion of the cost was paid they were required to undertake to pay for enough electricity to yield annually 20 per cent of the Board's capital outlay for five years.

Slag Cement Dams

In an attempt to reduce constructional costs and save cement, the North of Scotland Hydro-Electric Board has decided to use ground blast-furnace slag in the construction of the Loyne and Cluanie dams of the Glen Moriston hydro-electric scheme in Inverness-shire, the contract for which has been placed with the Mitchell Engineering Co., Ltd.

Slag was used in part replacement of Portland cement in the construction of a large dam at Bort-les-Orgues, Central France, and the reports received were so encouraging that the North of Scotland Board sent a deputation consisting of two engineers and a chemist to get fuller details.

The Trief process, which the Board is to try out, was patented by M. Victor Trief, a Belgian. It consists of using blast-furnace slag (which is at present virtually a waste product) by grinding it wet at site in a rotary grinder. The slurry so produced is passed direct into the concrete mixers to be mixed with the appropriate quantities of Portland cement, aggregate and sand, to produce a concrete equal in strength to a similar mixture wholly using Portland cement.

The French also claim that the slag cement concrete produces less heat when setting and is more resistant to acid peaty waters than pure Portland cement concrete. The slag available from Scottish steel works contains not quite so much lime as the slag the French used.

The Cluanie dam is to be 112ft high and 2,165ft long and the Loyne dam 58ft high and 1,745ft long. The proportion of slag cement to Portland cement will probably be about one-third Portland and two-thirds blast-furnace slag, in which case the saving in Portland cement will amount to about 20,000 tons. In the construction of the dams, the Mitchell Engineering Co. is also adopting another idea which was tried out at Bort, namely, to use precast concrete slabs for the faces of the dams so that neither steel nor timber shuttering will be needed and the demand for these two scarce materials will be reduced.

Traction Charges

Following a report by the general manager of the Bradford Passenger Transport Department, Mr. C. T. Humpidge, that the Yorkshire Area Council of the Municipal Passenger Transport Association had approved a report on the standardization of electricity charges, which would mean a reduction in the charge to Bradford from 1·898d to 1·207d/kWh, resulting in a saving of £30,000 a year, the Bradford Corporation Transport Committee is recommending approval of the proposals. According to Councillor A. S. Downey, chairman of the Committee, the Electricity Board has agreed to make the reduction retrospective to last year.

Californian Project

The American Bureau of Reclamation's Folsom power plant, in California, for which the English Electric Co., Ltd., has been awarded a contract for an 80,000 kVA auto-transformer (*Electrical Review*, 2nd May, p. 976), will have an ultimate capacity of 162,000 kW, made up of three 54,000 kW generators. The site is on the American River at Sacramento and the total cost of the scheme is estimated at $36·8 million. The contract placed with the English Electric Co. requires shipment of the transformer in 730 days, the company being the only one to promise delivery within that period. The nearest time offered was 917 days by the Westinghouse Electric Corporation.

Power Costs in Textile Mills

The Federation of Master Cotton Spinners' Associations has informed the North Western Electricity Consultative Council that when short time is worked in the mills, the new standard electricity tariffs will have a serious effect on production costs, making it impossible for electrically-driven mills to compete with steam-driven mills at home or with competitors overseas. Failure to make compensatory adjustments can only result in the situation of the electrically-driven mills concerned becoming desperate. The maximum demand charge gives an advantage to mills working two or three shifts; in the case of single-shift working there is a great disadvantage which becomes worse if the factory goes on short time.

Power Production in Sweden

The average production capacity of Sweden's power plants has now reached the annual figure of 20,000 million kWh, according to a report presented at the annual meeting of the Swedish Water Power Association on 23rd April. During 1951 the harnessed water power increased by 254 MW to 3,482 MW, this addition being mainly accounted for by the bringing into operation of the large Harspränget station above the Arctic Circle. Investigations are now being carried out into the possibility of constructing a 360 MW plant at Norrfors on the Ume River in North Sweden.

Supply to Estate

The North Eastern Electricity Board has informed Sunderland Corporation that it is prepared to supply electricity to 358 houses on the Marley Pots estate, Southwick, provided the Corporation carries out the wiring. The Corporation Estates Committee is discussing the matter.

NEXT WEEK'S EVENTS

Tuesday, 13th May

BELFAST.—Presbyterian Hostel, Howard Street, 6.45 p.m. I.E.E. Northern Ireland Centre. Annual general meeting. "Modern Telegraph Practice," by Major E. H. Wilkinson.

LONDON.—85, Minories, E.C.3, 5.30 p.m. Institute of Marine Engineers. "Steam Pipe Materials for Advanced Steam Conditions," by D. W. Crancher.

NEWPORT.—Tredegar Arms Hotel, 7 p.m. Newport and District Electric Club. Annual general meeting.

Wednesday, 14th May

BIRMINGHAM.—James Watt Memorial Institute, 6.45 p.m. I.E.E. South Midland Students' Section. Annual general meeting.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "A Phototelegraphy Transmitter-Receiver Utilizing Sub-Carrier Frequency Modulation," by R. O. Carter and L. K. Wheeler.

I.E.E. London Students' Section, 2.30 p.m. Visit to Osram-G.E.C. Lamp Works, Hammersmith, W.6.

Thursday, 15th May

DUBLIN.—28, Merrion Square, 6 p.m. I.E.E. Irish Branch. Annual general meeting.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Annual general meeting.

Saturday, 17th May

LONDON.—I.E.E. Utilization Section Summer Visit.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Vanitys, Ltd., report a trading profit for 1951 of £35,812, as compared with a loss of £13,033 for 1950. After deducting £9,826 for depreciation, £3,400 for taxation, and £10,000 for stock contingencies, there is a net profit of £12,586 (against a loss of £24,825). It is proposed to pay a dividend for the year of 5 per cent, and a bonus of 2½ per cent (against nil). The balance carried forward after payment of £5,000 compensation to a former executive director, is £20,928 (against £16,679, after a transfer of £20,000 from general reserve).

Babcock & Wilcox, Ltd., report a group profit for 1951 of £2,076,718, as compared with £1,651,771 for 1950. The profit is struck after providing £3,104,805 for taxation, £659,253 placed to capital reserve, £172,728 to taxation equalization reserve, and crediting £48,869 sundry capital profits. The amount attributable to Babcock & Wilcox is £2,059,103 (against £1,639,047). General reserve receives £800,000, research and development reserve £150,000, and contingencies reserve £291,461. The ordinary dividend for the year is maintained at 18 per cent, by a final payment of 7½ per cent, and a bonus of 3 per cent.

The Watford Electric & Manufacturing Co., Ltd., reports a trading profit for 1951 of £58,600, as compared with £49,776 for the preceding year, and a net profit of £23,600 (against £22,450). The proposed final dividend is 10 per cent, with a bonus of 10 per cent, again making 25 per cent for the year. The 160,000 ordinary 2s shares issued last June are entitled to one-half of both interim and final distributions.

The Anglo-Portuguese Telephone Co., Ltd., reports a net profit for 1951, after taxation, of £117,642, as compared with £90,143 for the preceding year. Contingencies reserve receives £38,866, and it is proposed to pay a final dividend of 5 per cent, making 8 per cent (same) on the ordinary stock and a dividend of 8 per cent (same) for the year on the "A" ordinary, leaving £74,812 to be carried forward. It is proposed to increase the capital to £2,700,000 by the creation of 1,000,000 additional ordinary £1 shares.

W. Canning & Co., Ltd., report a net profit for 1951, after deducting £398,151 for taxation, of £163,262, as compared with £172,301 for 1950. The net profit is struck after placing £25,695 to reserve to meet increased cost of replacement of fixed assets, and providing £60,000 against losses arising from the fall in market prices of materials in 1952. The final ordinary dividend is 1s 3d per 5s unit (same), making 35 per cent for the year (against 30 per cent). General reserve receives £25,000, and contingencies reserve £50,000.

The Power Securities Corporation, Ltd., reports a group profit for 1951, after all charges, including £242,742 for taxation, of £140,485, as compared with £145,520 for 1950. The ordinary dividend for the year is unchanged at 6 per cent.

The Electricity Trust of South Australia is issuing £A3,971,260 4⅛ per cent "Q" debentures at par as a conversion operation to deal with "L," "O" and "F" debentures which are due for repayment on 1st June next.

The National Gas & Oil Engine Co., Ltd., reports a trading profit for 1951 of £440,942, as compared with £412,945 for 1950, and net profit, after meeting all charges, of £240,525 (against £293,437). The ordinary dividend for the year is maintained at 6 per cent and £122,822 is carried forward (against £44,985 brought in).

Telephone Rentals, Ltd., reports a group profit, after all charges, for 1951 of £270,271, as compared with £239,236 for 1950. It is proposed to pay a final dividend of 6 per cent, making 10 per cent for the year. This is at the same rate as for the previous year, but is paid on capital increased by a 10 per cent share bonus.

Worthington-Simpson, Ltd., report a net profit for 1951, after taxation of £311,000, of £217,363 (against £201,375). The final ordinary dividend is 10 per cent, again making 20 per cent for the year.

A proposal to issue 96,000 new ordinary shares of 10s each to ordinary shareholders will be submitted at an extraordinary meeting to be held on 1st July.

International Combustion Africa, Ltd., is paying an interim dividend of 10 per cent (unchanged).

Wm. Sanders & Co. (Wednesbury), Ltd., report a trading profit of £40,574 for 1951, as compared with £50,164 for 1950, and a net profit, after providing for taxation and other charges, of £12,784 (against £18,036). It is

proposed to pay an ordinary dividend of 25 per cent and to carry forward £25,965 (against £23,024 brought in).

Simms Motor Units, Ltd., report a trading profit of £314,635 for 1951, as compared with £244,495 for the previous year, and a net profit of £258,876 (against £194,587). The ordinary dividend for the year is 17½ per cent (same).

New Companies

R. A. Ure & Co., Ltd.—Registered in Edinburgh 29th March. Capital £7,000. Electricians, mechanical engineers, etc. Directors : R. A. Ure and W. Park. Regd. office : 47, Bishop Street, Glasgow.

Cowlans, Ltd.—Registered 10th April. Capital £100. Electrical engineers and contractors, etc. Directors : S. Cowlan and Mrs. Phyllis M. Cowlan. Regd. office : 349, Forest Road, Walthamstow, E.17.

Wards Electrical Services (Westergate), Ltd.—Registered 18th April. Capital £1,000. Directors : E. R. Ward, Mrs. Alice E. Ward and K. E. Ward. Regd. office : Warren Cottage, Westergate, nr. Chichester, Sussex.

J. H. Products (Electrical), Ltd.—Registered 19th April. Capital £100. Manufacturers of and dealers in electrical and mechanical apparatus of all kinds, etc. Directors : J. C. Ladd and H. Livesey. Regd. office : 307, Whitehorse Road, West Croydon, Surrey.

Ivan Veck, Ltd.—Registered 23rd April. Capital £4,000. Electricians, electrical, mechanical, television and radio engineers, etc. Directors : I. Veck, L. J. Smailes and P. C. Smailes. Regd. office : 129/131, Albert Road, Southsea, Portsmouth.

Peart & Co. (Electrical), Ltd.—Registered 25th April. Capital £5,000. Electrical wholesalers, merchants, manufacturers, maintainers and repairers of and dealers in electrical apparatus and accessories, etc. Directors : S. Glithero and Mrs. Edith Glithero. Regd. office : Onward Works, Manchester Road, Hyde, Ches.

Increases of Capital

Cressall Manufacturing Co., Ltd.—Increased by £50,000, in £1 shares, beyond the registered capital of £50,000.

Wilkins & Mitchell, Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £110,000.

Brush Electrical Engineering Co., Ltd.—Increased by £1,000,000, in £1 unclassified shares, beyond the registered capital of £4,000,000.

Phœnix Telephone & Electric Holdings, Ltd.—Increased by £50,000, in 5s ordinary shares, beyond the registered capital of £411,695.

Bill Switchgear, Ltd. — Increased by £96,000 in £1 ordinary shares, beyond the registered capital of £4,000.

Winding-up Petition

Henray Electrical Co., Ltd.—A petition for the winding up of this company was presented to the High Court on 28th April by Precision Screw & Tool Manufacturers (a firm), and will be heard in London on 12th May. Any person intending to appear on the hearing must notify Capel Cure & Clarke, 6, Hobart Place, London, S.W.1, solicitors for the petitioner, by 10th May.

Liquidation

Allen & Welsby, Ltd.—Winding up by means of a members' voluntary winding up. Liquidator, Mr. L. K. Taylor, 78, King Street, Manchester, 2.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to dates mentioned:—

16th May

HENRY WIGGIN (design). No. 701,307, Class 9. Anodes for electro-deposition, and electrodes for electric welding.—Henry Wiggin & Co., Ltd., Sunderland House, Curzon Street, W.1.

ELA (design). No. 703,355, Class 9. Scientific instruments and apparatus, all sold complete, but not including wireless telephonic and signalling instruments and apparatus.—Electricals, Ltd., 14, Claremont Place, Newcastle-upon-Tyne, 2.

DURITE. No. 704,228, Class 9. Electrical apparatus and instruments and parts thereof and fittings therefor, all included in Class 9.—Gordon Equipments, Ltd., 161, Queen's Road, Buckhurst Hill, Essex.

HISTOKINETTE. No. 705,073, Class 9. Electrical apparatus and instruments included in Class 9, scientific, weighing, measuring and teaching apparatus and instruments and parts included in Class 9 of all such goods.—Hendrey Relays, Ltd., 392, Bath Road, Cippenham, Slough, Bucks.

MEGISTOR. No. 705,333, Class 9. Electrical resistances.—Morgan Crucible Co., Ltd., Battersea Church Road, London, S.W.11.

ENFO. No. 699,685, Class 11. Lamps, lamp glasses, anti-dazzle devices for vehicle lamps, automobile reflectors, lamp reflectors, electric lamp bulbs and holders therefor, heating apparatus, apparatus included in Class 11 for ventilating and air conditioning, and lighting installations, all being for use in motor vehicles.—Ford Motor Co., Ltd., 88, Regent Street, London, W.1.

23rd May

ASBESTAL. No. B704,006. Class 9. Asbestos-insulated, aluminium-sheathed, electric conductors or cables.—Pirelli-General Cable Works, Ltd., 343 to 345, Euston Road, London, N.W.1.

SIGRI. No. 704,837. SIGRI (design). No. 704,841. Class 9. Electrical, electro-technical and chemical apparatus and parts of all such apparatus, all being goods made wholly or principally of carbon or graphite and included in Class 9.—Siemens-Planiawerke Aktiengesellschaft für Kohlefabrikate, Meitingen bei Augsberg, Germany. Address for service, c/o G. F. Redfern & Co., Redfern House, Dominion Street, London, E.C.2.

GYROMAX. No. 704,958. Class 10. X-ray tubes and housings therefor.—Newton Victor, Ltd., 15–19, Cavendish Place, London, W.1.

STOCKS and SHARES

ANOTHER week of inactivity in the Stock Exchange has made little material difference to the general level of prices, which are, however, at least retaining the greater part of last month's decided improvement. The gilt-edged market is credited with a good performance in giving ground only slightly in the face of the big British Electricity loan. This has helped to sustain industrial share prices, which have also received support from a number of the latest company dividend and profits announcements, including those of Babcocks and Johnson & Phillips. Conditions in the electrical equipment market have been a little irregular, but rises of 1s or more can be recorded for London Electric Wire (on which the dividend is due shortly), Revo, Burco, Westinghouse Brake, Telegraph Condenser and C. A. Parsons. The last two instances furnish a reflection of the persistent attraction of highly conservative dividend policies. Laurence, Scott retain the previous week's rise of 1s 6d on the increased dividend, but Allen West have lost 6d of the earlier advance of 2s.

British Electricity Stock

The new 4¼ per cent British Electricity Stock, redeemable 1974–79, after going back to ⅜ discount, recovered to a small premium on the price of 99 at which the £150 million stock was issued a fortnight ago. It is the impression that a major part was taken up by Government Departments which will, in accordance with the modern technique on these occasions, discharge their holdings into the market by degrees regulated to assure the least disturbance. The prospect of a "tap" of this description in operation, and for some time to come, has not prevented gilt-edged prices as a whole from presenting a firm front. They have lost but little of the notable recovery which had previously restored them to levels prevailing before the rise in the Bank Rate to 4 per cent.

The New Yield and Safety

Other things being equal, it is thought unlikely that undue delay or difficulty will occur in the process of finding permanent homes for the new loan. No other Government security couples a current yield as good as 4·3 per cent with fixed dates for the repayment of the capital. It comes as a boon to many trustees and must appeal to the ranks of private investors in need of present income but unwilling to leave their capital without the certain safeguards which are lacking in the high-yielding but "undated" stocks, such as 3½ per cent War Loan. For many of the institutional and other types of investors, there will remain more appeal in the tax-free capital profits which will accrue at maturity on some of the 3 per cent stocks, such as the senior British Electricity issues, for a buyer at to-day's discounts.

Cable Dividends

Johnson & Phillips £1 shares at 49s 6d are quoted ex the final dividend of 7½ per cent declared last week, allowing for which the price is about 1s 6d to the good. For the year, the total is again 15 per cent on which basis the shares give approximately 6 per cent return. The profits statement upheld the high standard established earlier in this section of the electrical market by the annual results of Telegraph Construction and British Insulated Callender's. Net profits at £350,000, after tax and the usual charges, are more than 60 per cent above last year's corresponding figure. Dividends began to accrue during the period on the million new 4½ per cent preference shares issued at par a year ago, but the surplus leaves room for the substantially larger appropriation of £250,000 this time for reserves. Interest in this market turns now to the Siemens results, due this month.

Market News

Associated Insulation Products 5s shares have been a good market in advance of the dividend and results for 1950, rising during the week from 16s 6d to 18s, after touching 18s 9d. The interim was raised in October from 6 to 8 per cent, but with the proviso that this did not necessarily imply a bigger total than last year's 20 per cent. There has been little change in Babcock & Wilcox ordinary around 66s since news of the maintenance of the dividend at 18 per cent. It comes this time from substantially bigger earnings, which, at over £2 million, show an increase of £400,000, despite a previous deduction of £650,000 for capital reserve. A yield of under 5½ per cent on the shares testifies to their investment status and to the well protected rate of dividend.

Recovery of Veritys

Veritys 5s shares, which were quoted down to 2s 9d last year after the passing of the dividend, have changed hands at up to 4s (although the official quotation remains at 3s 3d) since the notification of a 7½ per cent payment (including 2½ per cent as bonus) for 1951, and of a great improvement in the financial results. A trading profit of nearly £36,000, against a previous loss of £13,000, confirms the expectations based on the chairman's review a year ago, when he reported a three-fold increase in the value of orders on hand, and an improvement in output as the result of works reorganization.

Electrical Investments

Past Week's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price May 5, 1952	Week's Rise or Fall	Est. Yield p.c.
Gilt-edged and Overseas Stocks			£ s	d	
Brit. Elec. 1968/73	3	3	83	−½	3 12 3
Brit. Elec. 1974/77	3	3	82½	—	3 12 9
Brit. Elec. 1976/79	3½	3½	88	—	3 19 7
Brit. Elec. 1974/79	—	4¼	98½	—	4 6 3
Calcutta Elec. ..	6†	6†	20/-	—	6 0 0†
East African Power	7	7	28/3	—	4 19 1
Nigerian Elec. ..	10	10	23/9	−1/6	8 8 6
Palestine Elec."A"	5†	5†	15/-	—	6 13 4†
Perak Hydro-Elec.	Nil	Nil	11/6	—	—
Equipment and Manufacturing					
Aberdare Cables(5/-)	20	20	11/-	−6d	9 1 9
Aerialite (1/-) ..	83½	88½	8/3	—	10 14 0
Aron Elec. Ord. ..	15	15	32/6	—	9 4 6
Assoc. Elec. Ord.	20	20	71/6	—	5 12 0
Automatic Tel.& El.	12½	15	57/6	−¼	5 4 3
Babcock & Wilcox	18	18	66/-	−3d	5 9 0
Baldwin, H. J.(2/-)	25	25	4/9	—	10 10 6
British Aluminium	10	12	40/3	−6d	5 19 3
B.I. Callender's ..	7½	9	30/9	—	5 17 1
British Thermostat (5/-)	30	30	27/-	—	5 11 1
British Vac.Cleaner (5/-)	25	25	13/9xd	—	9 1 9
Brook Motors ..	20	20	32/-	—	6 5 0
Brush Ord. (5/-) ..	10	10	5/6	−3d	9 1 9
Burco (5/-) ..	42½	38¾	20/-	+⅛	9 13 9
Chloride El.Storage	15	15	60/-	—	5 0 0
Cole, E. K. (5/-) ..	20	25	15/6	—	6 9 0*
Cossor, A. C. (5/-)	Nil	Nil	12/-	−6d	—
Crabtree (10/-) ..	17½	17½	32/-	—	5 9 5
Crompton Parkinson Ord. (5/-) ..	11½	11½	9/-	—	6 5 0
De La Rue (5/-) ..	50	50	14/6	—	8 12 4*
Decca (1/-) ..	112½	112½	17/-	−6d	6 12 3
E.M.I. (10/-) ..	8	12	15/-	−9d	8 0 0
Electrical Components (5/-) ..	20	20	11/3	—	8 17 10
Elec. Construction	15	15	47/6	—	6 6 3
Enfield Cable Ord.	7½	7½	27/-	—	5 11 0
English Electric ..	15	15	55/6	—	5 8 0
Ericsson Tel. (5/-)	22†	22†	38/9	—	2 16 8†
Ever Ready (5/-)	35	35	25/6xd	—	6 17 3
Falk Stadelmann	15	15	37/6	—	8 0 0
G.E.C. Ord. ..	17½	22½	80/6	—	5 11 9
General Cables (5/-)	38	30*	17/6	—	8 11 6
Greenwood & Batley	15	15	41/3	—	7 5 0
Hackbridge Cable (5/-)	20	20	10/9	—	9 6 0
HackbridgeHewittic (5/-)	15	18	14/6	—	6 4 2
Hall Tel. Acc. (10/-)	10	10	11/6	—	8 13 10
Heatrae (2/-) ..	12½	12½	4/-	—	6 5 0
Henleys (5/-) ..	20	20	17/6	−6d	5 13 8
Hoover (5/-) ..	37½	35*	25/9	−6d	6 16 0
Intl. Combustion (5/-)	20	25	21/9	—	5 15 0
Johnson & Phillips	15	15	49/6xd	+1/6	6 1 3
Equipment and Manufacturing (continued)					
Lancashire Dynamo	22½	12½*	43/3	—	5 15 6
Laurence,Scott(5/-)	12½	15	12/-	—	6 5 0
London Elec. Wire	10	10	40/6	+1/9	4 18 9
J. Lucas	17½	7½*	32/-	—	4 13 9
Mather & Platt ..	12½	12½	43/9	—	5 14 2
Metal Industries ..	10	10	37/-	—	5 8 0
Mid. Elec. Mfg. ..	15	15	56/3	—	5 6 9
Murex	10	12½	48/6	—	5 2 6
Newman Ind. (2/-)	6	10	2/9xd	—	7 5 6
Oldham & Son (1/-)	30	30	4/3	—	7 1 3
Parsons, C. A. ..	15	10*	48/9	+½	4 2 0
Plessey (5/-) ..	20	22½	16/3	—	6 18 6
Pye Deferred (5/-)	35	18*	17/-	—	5 6 0
Revo (10/-) ..	27½	27½	35/6	+1/9	7 15 0
Reyrolle	15	10*	44/-	—	4 11 0
Scot. Cable (4/-) ..	30	30	20/3	—	5 18 5
Siemens Ord. ..	7½	10	36/-	—	5 11 1
Switchgear & Cowans (5/-)	22½	22½	13/9	—	8 3 9
T.C.C. (10/-) ..	20	20*	46/3	+¼	4 6 6
T.C. & M. ..	10	10	34/6	—	5 16 0
TelephoneMfg.(5/-)	10	10	8/6	—	5 17 8
Thorn Elec. (5/-)..	20	10*	8/3	—	6 1 3
Tube Investments	25	25	5⅜	—	4 9 0
Vactric (5/-) ..	Nil	Nil	5/9	—	Nil
Veritys (5/-) ..	Nil	7½	3/3	—	11 10 10
Walsall Conduits (4/-)	70	70	47/6	—	5 18 0
Ward & Goldstone (5/-)	44	45*	36/3	—	6 0 0
Watford (2/-) ..	25	25	6/-xd	+3d	8 6 8
Westinghouse Brake	14	14	48/9	+⅛	5 14 10
West, Allen (5/-)..	12½	15	11/9	−6d	6 7 9
Trusts, Transport and Communications					
Anglo-Am. Tel.: A Ord.	—	—	85	−2½	—
Ord.	—	—	58	—	—
Anglo-Portuguese	8	8	21/3	—	7 10 7
Atlas Elec. ..	3	4	18/3	−3d	4 7 8
Brit. Elec. Traction: Def. Ord. ..	22½	25	395	−10	6 6 6
Cable & Wireless: Ord.	6	8	112½	+1	7 2 3
4% Loan ..	4	4	97	+½	4 2 6
Calcutta Trams ..	6†	6†	24/-	+6d	5 0 0†
Cape Elec. Trams	4	5	12/6	—	8 0 0
Globe Tel. & Tel. Ord.	—	—	23/-	—	—
Inter. Tel. & Tel...	Nil	15cts	32½	−1	—
Marconi Marine ..	7½	10	28/9	+⅛	6 19 3
Oriental Tel. Ord.	16	16	54/6	−⅛	—
Telephone Props.	7	8	32/6	+3/9	4 18 6
Tele. Rentals (5/-)	10	10	8/6	—	5 17 8

* After capital bonus.
† Dividends are paid free of Income Tax.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 18th June from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1946

3290. Brasch, A. A.—Arrangements for irradiating substances with electrons. 4th November, 1946. (673921.)

1947

4854. British Thomson-Houston Co., Ltd.—Electromagnetic wave modulation device incorporating electron discharge apparatus. 8th February, 1947. (674022.)

18604. Brasch, A. A.—Devices for the treatment of matter with high-speed electrons. 14th July, 1947. (673921.)

27488. Larsen, F. O. W.—Electrically operated calculating machines. 14th October, 1947. Convention date not granted. (673926.)

1948

5983. Director of the Office of Technical Services, Department of Commerce.—Magnetron. 27th February, 1948. (674035.)

16454. British Thomson-Houston Co., Ltd.—Cathode-ray devices. 18th June, 1948. (674041.)

17694. White, E. L. C.—Pulse generating apparatus. 17th June, 1949. (673933.)

17901. Sciaky, D.—Electric welding apparatus. 2nd July, 1948. (674042.) 17902. Protective system for three-phase single-phase machines. 2nd July, 1948. (674043.)

20212. Huntley, K. G.—Pulse-operated thermionic valve apparatus such as is suitable for pulse counting frequency division, or for generating a potential variation of stepped waveform. 23rd July, 1949. (673935.)

20929. Philips Electrical, Ltd.—Telegraphic transceivers. 9th August, 1948. (674045.)

20970. Duyck, G.—Method of manufacturing electromagnets and electromagnets produced by said method. 9th August, 1948. (Cognate applications 20971, 9th August, 1947, and 20972, 28th July, 1948.) (674046.)

31995. Philips Electrical, Ltd.—Circuits for automatic frequency control. 10th December, 1948. (Cognate applications 31996, 22nd May, 1948, and 31997, 6th July, 1948.) (673945.)

1949

1488. Philips Electrical, Ltd.—Sealing-off of exhaust tubes of electric discharge tubes. 19th January, 1949. (671163.)

3816. Reyrolle & Co., Ltd., A., and Hibbert, J. W.—Electric motors and their control means. 9th February, 1950. (Cognate application 20704, 9th August, 1949.) (674167.)

6429. McSorley, D. J., and Robins, J. T.—Automatic telephone alarm signalling apparatus. 22nd May, 1950. (Cognate application 15531, 10th June, 1949.) Addition to 638155. (673954.)

6809. Thornton Owen, Ltd.—Mountings or lanterns for tubular fluorescent lamps. 12th June, 1950. (674171.)

7815. Metropolitan-Vickers Electrical Co., Ltd., Minister of Supply, and Miller, C. W.—Microwave circuit arrangements. 15th March, 1950. (673957.)

9257. Taylor, Taylor & Hobson, Ltd.—Electrical devices for measuring mechanical displacements. 4th July, 1950. (674174.)

9374. Babcock & Wilcox, Ltd., and Carson, H. L.—Apparatus for examining the interiors of bodies by means of ultrasonic waves. 6th April, 1950. (674235.)

10411. Revo Electric Co., Ltd., and Felton, A. E.—Rotary electric switches. 20th April, 1950. (674176.)

11449. Pyrotenax, Ltd.—Electric cables. 21st April, 1950. (674068.)

11771. Standard Telephones & Cables, Ltd.—Telecommunication systems with particular reference to power supply arrangements therefor. 28th April, 1950. (674141.)

11953. British Vacuum Cleaner & Engineering Co., Ltd., and Brown, I. G. O.—Automatically resetting electric switches. 4th May, 1949. (674069.)

12861. Metropolitan-Vickers Electrical Co., Ltd., Lane, H. J. S., and Cox, F. W.—Electrically operated stop motions for power-driven looms. 20th April, 1950. (Cognate application 14477, 30th May, 1949.) (673969.)

13773. Santon, Ltd., Trevelyan, R. J., and Nyblad, L. J.—Liquid heaters. 24th May, 1950. (674073.)

14082. United Insulator Co., Ltd., and Hiles, E. L.—Construction of group of electric circuit elements including a capacitor. 26th May, 1950. (674146.)

14323. Ekco-Ensign Electric, Ltd., and Stickley, W. A.—Means for controlling the circuit of a discharge lamp. 30th May, 1950. (674148.)

15059. Ekco-Ensign Electric, Ltd., and Hewson, W. A.—Manufacture of fluorescent material. 5th June, 1950. (674077.)

15062. Electric & Musical Industries, Ltd.—Circuit arrangements for converting pulses of different durations into pulses of different amplitudes. 5th June, 1950. (673972.)

15989. National Research Development Corporation.—Underground gasification of coal. 31st July, 1950. (674082.)

16495. Luzzatto, B. B. A.—Apparatus for the electrolytic production of materials. 21st June, 1949. (674157.)

16757. Gfeller Akt.-Ges. Apparatefabrik.—Variable contacts for microphones or other transducing devices using carbon granulars. 23rd June, 1949. (673975.)

17489. British Thomson-Houston Co., Ltd. (General Electric Co.).—Brush mechanism for dynamo-electric machines. 1st July, 1949. (673977.)

18326. Arc Manufacturing Co., Ltd., and Appleton, W. A.—Electrical arc welding. 5th July, 1950. (674159.)

19202. Crabtree & Co., Ltd., J. A.—Electrically tripped switches. 22nd June, 1950. (674084.)

19203. Crabtree & Co., Ltd., J. A.—Thermal overload release devices for electric contactor or automatic circuit breakers. 22nd June, 1950. (674085.)

19389. Automatic Telephone & Electric Co., Ltd.—Telephone systems. 23rd May, 1950. (674243.)

20320. Philips Electrical, Ltd.—Low-frequency amplifying circuits. 4th August, 1949. (673982.) 20321. Low-frequency amplifying circuit arrangements with tone control. 4th August, 1949. (673983.)

20424. Teletype Corporation.—Electrical telegraph systems. 5th August, 1949. (674245.)

21973. Ekco-Ensign Electric, Ltd., and Haegele, F. G. A.—Discharge-lamp circuits. 21st August, 1950. (674249.)

24652. Edison Swan Electric Co., Ltd., and Pocock, S. N.—Frequency selective valve apparatus. 9th August, 1950. (674252.)

25080. Communications Patents, Ltd.—Electric carrier wave signalling systems and apparatus. 29th September, 1950. (674254.)

25969. Metropolitan-Vickers Electrical Co., Ltd.—Devices for recording writing, sketches or the like. 25th May, 1950. (674183.)

27016. Marconi's Wireless Telegraph Co., Ltd.—Frequency-modulated panoramic radar receivers. 8th June, 1950. (674185.)

27774. Crabtree & Co., Ltd., J. A.—Automatic electric circuit breakers having thermal overload release units. 28th July, 1950. Addition to 634701. (674092.)

29164. Ekco-Ensign Electric, Ltd., and Stickley, W. A.—Electric transformer arrangements for use in the circuit of electric discharge lamps. 14th November, 1950. 674188.)

31438. British Insulated Callender's Cables, Ltd., and Hollinsworth, D. T.—Method of making a joint in an electric cable. 7th December, 1950. (674019.)

32102. General Electric Co., Ltd., and Foot, B. L.—Radio frequency electrical oscillators. 8th December, 1950. (674196.)

32498. British Thomson-Houston Co., Ltd.—Magnetic cores. 19th December, 1949. (674261.)

32796. Wright Electric Motors (Halifax), Ltd., and Clayton, E.—Means for coupling mechanisms to electric motors. 20th March, 1951. (674099.)

1950

1619. British Insulated Callender's Cables, Ltd.—Protective coverings for electric cables. 19th January, 1951. (674273.)

3517. Carr Fastener Co.—Holders for electric lamp bulbs or the like. 8th December, 1950. (674204.)

12933. Radio Corporation of America.—Three-electrode semi-conductor device. 23rd May, 1950. (674283.)

13568. Technical Assets, Inc.—Thermomagnetic generators and refrigerators. 31st May, 1950. (674284.)

17285. General Motors Corporation.—Stop-on-signal radio receiver apparatus. 11th July, 1950. (674295.)

17935. Naamlooze Vennootschap Fabriek van Electrische Apparaten Voorheen F. Hazemeijer & ...—Multiple block butt contacts for electrical switching apparatus. 18th July, 1950. (674302.)

21008. British Thomson-Houston Co., Ltd.—Continuous wave detection systems. 24th August, 1950. (674306.)

21268. Laukvik, H.—Electrode holders for electrodes for electric arc welding. 28th August, 1950. (674317.)

24051. Hoover, Ltd.—Electric suction cleaners and the like. 2nd October, 1950. (674312.)

28787. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Flexible electric cables. 24th November, 1950. (674318.)

30098. Radio Corporation of America.—Cathode ray tube system for colour television. 8th December, 1950. (674114.)

1951

24681. Crabtree & Co., Ltd., J. A., Wintle, T. D. G., and Besag, M. (legal representative of Besag, E., deceased).—Electrically tripped switches. 22nd June, 1950. Divided out of 674084. (674119.)

SWISS ELECTRICAL IMPORTS

IMPORTS of electrical machinery and apparatus into Switzerland last year showed a marked advance in nearly all the principal groups, the exceptions being insulators and telephone and telegraph apparatus. The advance in the meter and radio groups was about 50 per cent and in dynamo-electric machinery 40 per cent. In many items West Germany increased her share appreciably, but Great Britain was not a big participant.

The only line in which Switzerland was a larger importer than exporter was radio goods. Of meters and measuring instruments she exported about six times the value of her imports and of dynamo-electric machines thirteen times.

Class of Goods	1951 Sw. fcs. (000)	Inc. or dec. on 1950 Sw. fcs. (000)
Accumulators	2,378	+ 131
From United States	823	− 347
„ *France*	480	+ 310
„ *Sweden*	215	+ 5
„ *Germany*	477	+ 274
„ *Gt. Britain*	279	+ 53
Insulators	2,734	+ 754
From France	185	− 347
„ *Denmark*	2,234	+ 1,000
„ *Germany*	196	+ 122
Meters and measuring instruments	4,580	+ 1,540
From United States	1,846	+ 427
„ *Germany*	1,416	+ 604
„ *France*	469	+ 312
„ *Gt. Britain*	471	+ 103
„ *Holland*	195	+ 75
Telephone and telegraph apparatus	4,146	− 367
From Belgium	2,660	− 312
„ *Gt. Britain*	95	− 118
„ *Germany*	896	+ 314
„ *United States*	187	+ 51
Radio apparatus	20,121	+ 6,227
From Germany	6,238	+ 3,880
„ *Gt. Britain*	1,911	− 393
„ *Holland*	4,037	+ 1,590
„ *France*	1,032	− 109
„ *United States*	4,416	+ 414
„ *Sweden*	643	+ 93
Glass rectifiers	188	+ 27
From Holland	91	+ 7
Unspecified electrical apparatus over 500 kg.	157	+ 37
Unspecified electrical apparatus, 50 to 500 kg.	900	+ 261
From Germany	396	+ 175
„ *Italy*	140	+ 123
„ *Gt. Britain*	79	− 23
„ *United States*	162	+ 1
Ditto, 3 to 50 kg.	993	+ 319
From United States	241	+ 25
„ *Germany*	241	+ 113
„ *Italy*	135	+ 100
„ *Gt. Britain*	116	+ 34
Ditto, under 3 kg.	3,353	+ 1,373
Dynamo-electric machines	9,049	+ 2,659
From Italy	457	− 433
„ *France*	540	+ 235
„ *United States*	1,825	− 219
„ *Germany*	3,854	+ 2,505
„ *Gt. Britain*	1,285	+ 385
Lighting and starting equipment for motor vehicles	4,581	+ 1,024
From France	613	+ 128
„ *United States*	1,322	+ 333
„ *Germany*	1,588	+ 377
„ *Gt. Britain*	594	+ 165
Electric incandescent lamps	6,201	+ 1,490
From Germany	798	+ 399
„ *Holland*	2,990	+ 331

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Preston.—26th May. Borough Council. Pumping plant compressor starting unit, electric welding equipment and power cable to central depot. Borough engineer, Town Hall.

Cambridge.—Equipment for receiving and listening to radio programmes in the wards of Addenbrooke's Hospital. (See this issue.)

Hendon. — 26th May. Borough Council. Cables for lighting of North Circular Road. (See this issue.)

India.—BOMBAY.—31st May. Electric Grid Department, Government of Bombay. Supply of line materials and erection of 22 kV and 11 kV transmission lines of the South Gujurat electric grid scheme. (C.R.E. 14344/52. Ten/3910.)*

Nottingham.—16th June. Water Department. Diesel engines, generators, centrifugal borehole and booster pumps, electric motors, switchgear, etc., at Landlay pumping station. B. W. Davies, general manager, Water Department, Castle Boulevard.

Southend-on-Sea.—19th May. Corporation. Electrical installation at Chalkwell Hall Primary School. (See this issue.)

Uruguay.—MONTEVIDEO.—3rd June. Usinas Electricas y Telefonos del Estado. Supply of 600,000 steel cable rings to support telephone cables. (C.R.E. 14247/52. Ten/3912.)*

ORDERS PLACED

Gosforth (Northumberland). — U.D.C. Electric street lighting in Station Road, Church Avenue, Kenton Road, Salters Road, Haddricksmill Road and Jubilee Road, Gosforth (£3,661).—B. L. Oliver.

Grimsby.—Education Committee. Recommended. Electrical installation in workshop block at College of Further Education (£6,464).—B.C.S. Electrics, Ltd.

London.—L.C.C. Electrical installation work for the detritus pits scheme at the Northern Outfall Works (£10,718).—London Electricity Board.

Two switchboards for primary sedimentation scheme (£5,188).—Yorkshire Switchgear & Engineering Co., Ltd.

Instrument and telephone cables for old reservoir sludge digestion instrumentation scheme and gas burner flame failure alarm system (£1,194).—British Insulated Callender's Cables, Ltd.

Dismantling and removal of hydraulic lift and installation of an electric hospital type bed lift in Infirm Block at Hillside, Islington (£2,790).—Evans Lifts, Ltd.

Tynemouth. — Town Council. Electrical installation at the Marina Avenue branch library (£249), and at the new hall and corridor at the Priory School (£218). — Electric Equipment, Ltd. Electric wiring at the High School gymnasium and staff rooms (£599).—F. W. Johnson & Sons.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alsager.—Houses (40), Close Lane, for U.D.C.; F.H.M. Contractors, Ltd., Close Lane, Newcastle-under-Lyme.

Ampthill.—Houses (59), on six sites; H. Robinson, clerk to R.D.C., 12, Dunstable Street.

Ashington (Northumberland).—First instalment of mining technical school (£100,000); J. Urpeth, Front Street, Bedlington, Northumberland.

Banbury. — Brewery extensions; Hunt, Edmunds & Co., Ltd., Bridge Street.

Barnard Castle.—Houses (43), Victoria Road; North-Eastern Housing Association, Northumberland Road, Newcastle-on-Tyne.

Bedford.—Development of estate at Goldington (575 dwellings first section); borough surveyor, Newnham House, Horne Lane.

Bedlington.—Houses on nine acres site at Woodside; U.D.C. surveyor.

Bellingham (Northumberland).—Houses (26) for R.D.C.; H. Kindred, "Westacres," 145, West Road, Newcastle-on-Tyne.

Bellshill.—Houses (150) proposed by Lanarkshire C.C.; S. McColl, county architect, County Chambers, Beckford Street, Hamilton.

Billingham-on-Tees.—Shops (24) and flats (26), shopping centre site for Ravenseft Properties, Ltd.; L. H. Fewster & Partners, architects, 22, Conduit Street, London, W.1.

Birkenhead.—Conversion of buildings at Elm Street for use as offices, radio station, etc.; Messrs. Gild, architects, 19, Hamilton Square.

Birmingham.—Houses, Gilbertstone estate, Sheldon (40), Warstock Lane (24), and Northumberland Street (63); H. J. Manzoni, city engineer.

Blackpool.—Houses (124), Knowle estate east; R. Fielding & Son, Stanhope Road Works.

Boston.—Flats (16), Freiston Road; H. H. Adkins, Edwin Etreet, Boston.

Bradford.—Houses (140), Thorpe Edge estate, Idle and Haworth Road; city engineer, Town Hall.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

Brighton.—Flats (270), Hollingbury estate; borough engineer.

Factory at Hollingbury for K.D.L. Precision Engineers, Ltd.; town clerk.

Children's homes, Hawkhurst Road and Wolseley Road, Coldean; borough engineer.

Carlisle.—Factory additions, Kingstown Airport for the Kingstown Engineering Co., Ltd., Carlisle.

Conversion of large house into children's home; city engineer, 18, Fisher Street.

Houses (76) and flats (76), Harraby neighbourhood unit and twelve old people's houses at Upperby; city engineer.

Carlton (Notts).—Houses (20), Thoresby Avenue, for U.D.C.; H. H. Dawson, architect, Milton Chambers, Milton Street, Nottingham.

Cheadle and Gatley.—Block of flats, Stockport Road; surveyor, Town Hall, Cheadle.

Chester.—Houses for R.D.C.: Guilden Sutton (8); A. F. Illidge, Ltd., Frodsham. Barrow (8); Irby Estates, Ltd.

Chigwell.—Dwellings (38), North Loughton, for U.D.C.; White & Mileson, architects, Old Station Road.

Cockermouth.—Houses (40), Clifton; R.D.C. surveyor.

Coventry.—Rebuilding factory premises after fire; A. C. Wickman & Co., Ltd., Banner Lane.

Crook (Co. Durham).—Houses (37), Witton-le-Wear, for U.D.C.; Page, Son & Hill, architects, 75, King Street, South Shields.

Darlington.—Houses (56) at Haughton North and Haughton West; borough architect, Central Buildings.

Gosforth.—Flats (16), Haddricksmill Road, for U.D.C.; M. J. Liddell & Sons, builders, 36, Great North Road, Newcastle-on-Tyne.

Heywood.—Houses (68), Unity Street site; James Berry, Ltd., Heywood.

Jarrow (Co. Durham).—Factory for British Ropes, Ltd.; D. & J. Ranken, Ltd., builders, Stockton Road, Sunderland.

Additions to Jarrow Grammar School for Durham County E.C.; county architect, Court Lane, Durham.

Kidderminster.—Houses (50); Shipway & Partners, Ltd., Bristol Road South, Birmingham.

Lancashire.—Fire station at Hind Hill Street, Heywood; county architect, Preston.

Leeds.—Extensions at Chadwick Street for J. Tetley & Son, Ltd.; Evans, Clark & Woollatt, architects, Eldon Chambers, Wheelergate, Nottingham.

Liverpool.—Flats (48), Upper Pitt Street; C. J. Doyle & Sons, Ltd., Liverpool.

Fire station at junction of Caryl Street and Hill Street; Dr. R. Bradbury, city architect, Blackburn Chambers, Dale Street.

London.—BERMONDSEY.—New buildings for Guy's Hospital, St. Thomas's Street; Young & Hall, architects, 9, Southampton Row, W.C.1.

STEPNEY.—Dwellings (124), Cornwall Street; borough engineer.

WEST EALING.—Police married quarters, Royle Crescent; Architect's Department, New Scotland Yard, S.W.1.

Ludlow.—Houses (16), Sandpits site; John Bromley & Sons, Ltd., 74, Watling Street, Church Stretton.

Manchester.—New offices and warehouse at Trafford Park for Jackson Bros., Ltd.; Bramall & Smith, architects, 285, Corn Exchange Buildings, Manchester.

Maryport.—Factory extensions for British Bata Shoe Co., Ltd.; Border Engineering Contractors, Ltd., Scotch Street, Whitehaven.

Mitcham.—Civil defence report and control centre; borough engineer.

Northallerton.—Houses (54), Linden Road; U.D.C. surveyor, High Street, Northallerton.

Nottingham.—Erection of Farnborough Road Secondary School; Thomas Bow, 45, Lamartine Street. Erection of Brooksby Primary School, Greencroft; G. A. Pillatt & Sons, Ltd., Quorn Road, off Haydn Road.

Rotherham.—Houses (124), Toll Bar, Wortley Road, Kimberworth Park; E. J. Manson, borough surveyor, Municipal Offices.

Rottingdean.—C. of E. primary school; Hilton & Wright, architects, 11, Campden Hill Road, London, W.8.

Rowley Regis.—Houses (74), Brickhouse Farm estate; borough surveyor, Old Hill, near Cradley Heath.

Salford.—Conversion of ward G.1. at Hope Hospital for use as a chest clinic (£16,066); architect to Manchester Regional Hospital Board, Sunlight House, Quay Street, Manchester.

Smethwick.—Offices for Ministry of National Insurance; B. Whitehouse & Son, Ltd., 247, Monument Road, Edgbaston, Birmingham.

Southampton. — Rebuilding departmental stores; Edwin Jones & Co., Ltd., Houndwell.

Stockport.—Extensions for McVitie & Price, Ltd.; R. Dilworth, architect, Stockport.

Stokesley (Yorks).—Houses (72) on six sites; R.D.C. surveyor.

Stretford. — New transport depot; New Works Section, Road Haulage Executive, 150, Goswell Road, London, E.C.1.

Surbiton.—Factory extensions; Gattey (Engineering), Ltd., Roebuck Road.

Sutton (Surrey).—Houses (178), Banstead site; borough engineer.

Swansea.—Flats (56), Gwyrossydd, Penlan; borough architect.

Watford.—Houses (68), Tibbs Hill, Abbots Langley; Dawe, Carter & Partners, R.D.C. architects, 83, High Street, Watford.

Wembley.—Factory, Manor Farm Road and Ashton Road, Alperton; Allnat (London), Ltd., Chase Estate, Park Royal Road, N.W.10.

West Hartlepool. — Houses (26), Owton Manor. Builders: T. M. Stonehouse, Ltd. (8); W. W. Brazell, Ltd. (10); and T. A. Young (8). All local firms.

Workington.—Houses (148), Laverock Hall estate, for Jas. Leslie & Son; Jonathan Saul, architect, John Street.

Worksop.—Further 48 houses at Windmill Lane estate; borough surveyor.